DOCUMENT RESUME

ED 447 170 TM 032 012

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TITLE	A Report on the Matches between the South Dakota Standards in Mathematics and Selected Stanford Achievement Tests.
INSTITUTION	Mid-Continent Research for Education and Learning, Aurora, CO.
SPONS AGENCY	South Dakota State Dept. of Education and Cultural Affairs, Pierre.
PUB DATE	1999-09-00
NOTE	92p.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Academic Standards; *Achievement Tests; Elementary Secondary Education; *Mathematics; *State Standards; *Test Items
IDENTIFIERS	Curriculum Alignment; *South Dakota; *Stanford Achievement Tests

ABSTRACT

This report presents an analysis of the alignment between the grade level standards of the "South Dakota Standards in Mathematics" (December 1998) and test items from the Stanford Achievement Tests, Ninth Edition (Stanford 9). The tests of interest were: (1) Form S, Primary 2 (grade 2); (2) Form S, Intermediate 1 (grade 4); (3) Form S, Advanced 2 (grade 8); and Form S, Task 3 (grade 11). Two research analysts independently identified matches between the Stanford 9 test items for mathematics and the student knowledge and skills identified in the South Dakota standards. In every case, analysts, after discussion, were able to agree on the most appropriate matches for each test item. Once all test items were matched to the appropriate grade level standards, analysts were able to characterize how such grade level standards were assessed overall by the Stanford 9. Appendix A contains matches of test items with grade level standards. The test item matching is also presented in graph format in Appendix B. (Contains 35 figures and 2 tables.) (SLD)

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ED 447 170

A REPORT ON THE MATCHES BETWEEN THE SOUTH DAKOTA STANDARDS IN MATHEMATICS AND SELECTED STANFORD ACHIEVEMENT TESTS

FOR THE
SOUTH DAKOTA DEPARTMENT OF EDUCATION AND CULTURAL AFFAIRS

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SEPTEMBER 1999

Dr. John S. Kendall

TM032012

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PURPOSE OF REPORT

This report presents an analysis of the alignment between the grade level standards of the *South Dakota Standards in Mathematics* (December 1998) and test items from the *Stanford Achievement Tests, Ninth Edition,* or *Stanford 9*, published by Harcourt Brace Educational Measurement (formerly the Psychological Corporation). The tests of interest were as follows:

- Form S, Primary 2 (Grade 2)
- Form S, Intermediate 1 (Grade 4)
- Form S, Advanced 2 (Grade 8)
- Form S, Task 3 (Grade 11)

The purpose of this study is to describe for policy makers and other interested stakeholders how the mathematics standards are addressed by the *Stanford 9*. This study will

- identify those grade level standards that are assessed in the *Stanford 9* as well as those standards that are not assessed in the *Stanford 9*,
- characterize the ways in which the *Stanford 9* items test students on the knowledge and skills identified in the *South Dakota Standards in Mathematics*,
- identify any *Stanford 9* items that test students for knowledge and skills that have not been identified for those students in the South Dakota grade level standards, and
- provide summary graphs to represent how test items from the *Stanford 9* match the grade level standards.

METHOD OF ITEM MATCHING

Two research analysts independently identified matches between the *Stanford 9* test items for mathematics and the student knowledge and skills identified in the *South Dakota Standards in Mathematics*. When the two analysts completed their independent matches, they compared their results and discussed any discrepancies. For the area of mathematics, it was found that in every case analysts were able to agree about the most appropriate matches for each test item.

The analysts used two categories for identification during the matching process: direct and indirect. Direct matches indicate that a test item directly assesses the knowledge and/or skills identified in the grade level standards. For example, the *Stanford 9* test item #34 in the Problem Solving section of the mathematics Primary 2 test requires students to compare objects and indicate which is shortest. This test item directly corresponds to the Kindergarten Measurement Standard 6, which states that the students "compare objects or events using direct comparison according to a given attribute. Example: length (longer/shorter), height (taller/shorter), volume (holds more/holds less)." Almost all of the matches in the mathematics section of the tests were found to be of this "direct" type.

Occasionally, a less obvious, or "indirect," match was found to exist between a test item and a grade level standard. In such a case, the test item addressed content in the standard at some level, but there was not an exact match. For example, test item #4 in the Problem Solving section of the mathematics Primary 2 test requires students to identify which numeral is in the tens' place in a three-digit number. This item indirectly corresponds to the 2nd grade Number Sense Standard 14, which states that the students "use words, models, and expanded notation to represent numbers with two or more digits." Although the test item does not require the student to represent place value, the student does need to understand place value concepts in order to answer the item correctly. Therefore, this match was identified as an "indirect" match.

During the process of matching test items and standards, the research analysts first attempted to match the test items to standards that were at the same grade level as the test. If no match was possible, analysts then examined the standards for one grade *below* the grade level of the test. If there was still no match, the analysts examined the standards two grades below the level of the test. Finally, if there was still no match, the analysts examined the standards for one level *above* the grade level of the test . Table 1 illustrates the sequence analysts used in the matching process.

TABLE 1

Stanford 9 Test	Grade Tested	South Dakota Grades Analyzed for Matching (in sequence)
Primary 2	2	2, 1, K, 3
Intermediate 1	4	4, 3, 2, 5
Advanced 2	8	8, 7, 6, 9-12
Task 3	11	9-12

If at the end of this sequenced search for a match, there was still no match found between a test item and a South Dakota grade level standard, a "miss" was declared. However, if in the determination of the analysts the item could not be matched to the standards because it addressed a rudimentary skill below the range of grades searched, the item was not counted as a miss. For example, test item #9 in the Problem-Solving section of the mathematics Advanced 8 test requires students to identify numbers as prime or composite. This skill appears under 3rd grade Number Sense Standard 1, suggesting that it should have been mastered well before the test grade. It would be misleading, therefore, to count such a test item as a "miss" because there was no equivalent grade level standard within the search range. Such a test item was tagged as a "rudimentary skill."

DESCRIPTIVE ANALYSIS

Once all test items were matched to the appropriate grade level standards, analysts were able to characterize how such grade level standards were assessed overall by the *Stanford 9*. Analysts reviewed all the test items associated with a particular grade level standard and provided a summary narrative describing how students are asked to demonstrate their knowledge and skill. Finally, when test items appeared that were not addressed by the standards, analysts supplied not only a characterization of those items, but also selected one or more test items to represent the type of content that is assessed.

FORMAT FOR REPORTING

Matches of test items with grade level standards are presented in Appendix A. The test item matching is also presented in graph format in Appendix B.

Appendix A: Report by Benchmark

Appendix A first lists a summary of the South Dakota grade level standards that were of primary interest for the given test grade (that is, grades 2, 4, 8, and 11). For convenience, those grade level standards that were found to be assessed by test items in the *Stanford 9* are marked with an asterisk. The following is excerpted from the summary of grade level standards for grade 2:

Second Grade Number Sense Standards

The student will:

1.* count by number groups to 1000 or higher. (example: 3s, 4s, 5s, 10s, 20s)
2. associate verbal names, written word names, and standard numerals with whole numbers less than 1000.
3.* identify ordinal positions using ordered sets of objects.
4.* explain concept of even and odd numbers.
5. explore the concept of mixed numbers.
6.* solve two- and three-digit addition and subtraction problems.
7. estimate sums and/or differences of two whole numbers and find the answers using the appropriate methods of computing.
8. use models to explore addition and subtraction of fractions.
9. identify the correct usage of decimal point for decimals and money.
10. model problem situations in a variety of ways. (example: concrete materials, tables, charts, drawings, words)

In this excerpt of the first ten grade level standards from the 2nd grade Number Sense standards, it can be seen that four grade level standards (1, 3, 4, and 6) have been matched to test items on the *Stanford 9*.

Following the summary of standards, two charts summarize the matches for that test. The first chart (Figure 1) summarizes test matching across the *grades*; the second (Figure 2) summarizes test matching across the *standards*.

FIGURE 1

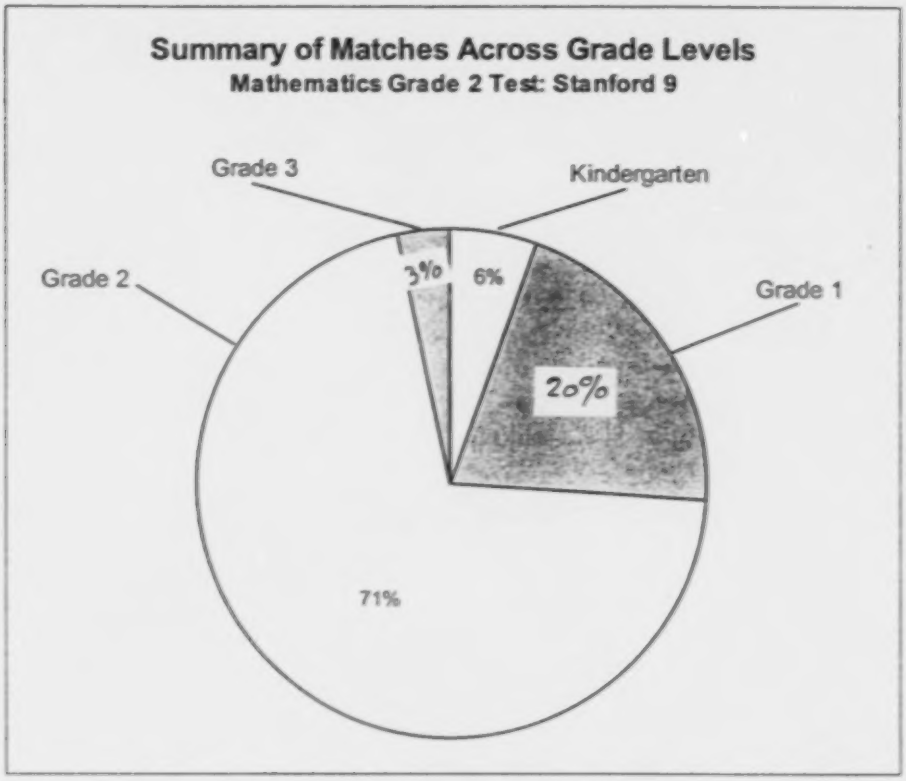
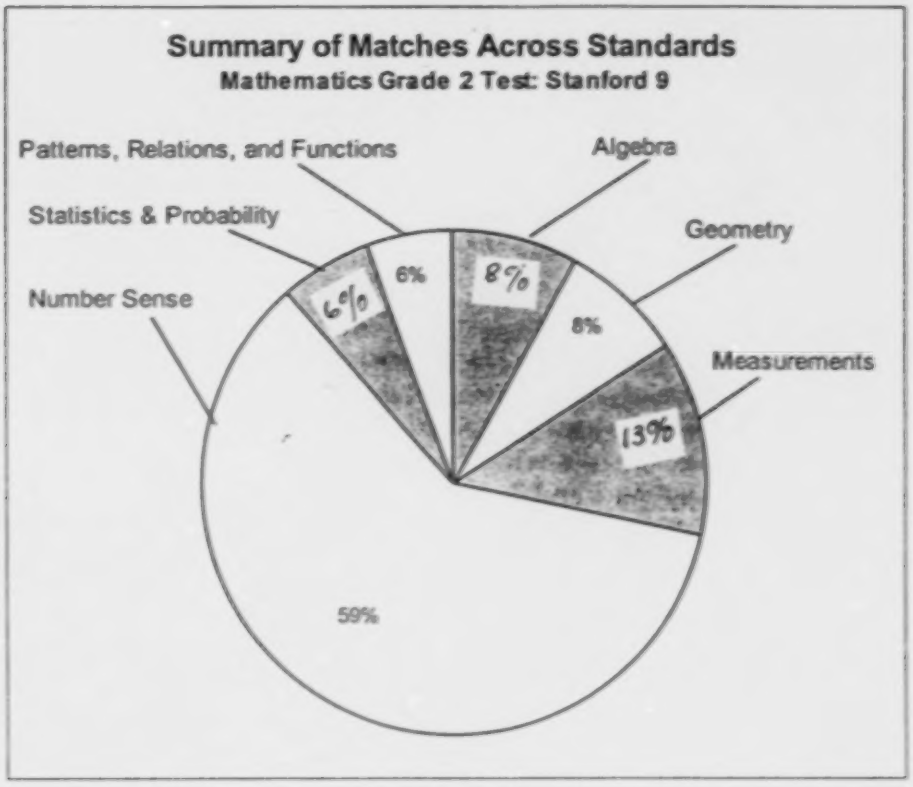


FIGURE 2



The detailed report of item matching follows the chart summaries. All grade level standards (within the range for analysis) that were found to match *Stanford 9* items are listed. Beneath each of these grade level standards, the matched test item (or items) is identified by test name, subtest, and item number. Above this is a characterization of the item or items. This characterization is intended to provide the reader with a sense of how students are asked to demonstrate their knowledge and skill relative to the grade level standard. The following example is taken from this section. It identifies a standard on measurement at the 8th grade level:

9. read, write, and explain exponential notation.

> Students must convert between scientific notation and standard form of numbers. Students must understand how to change exponential base to solve problems.
>
> *Grade 8 (Advanced 2)*
> Problem Solving 8, 10

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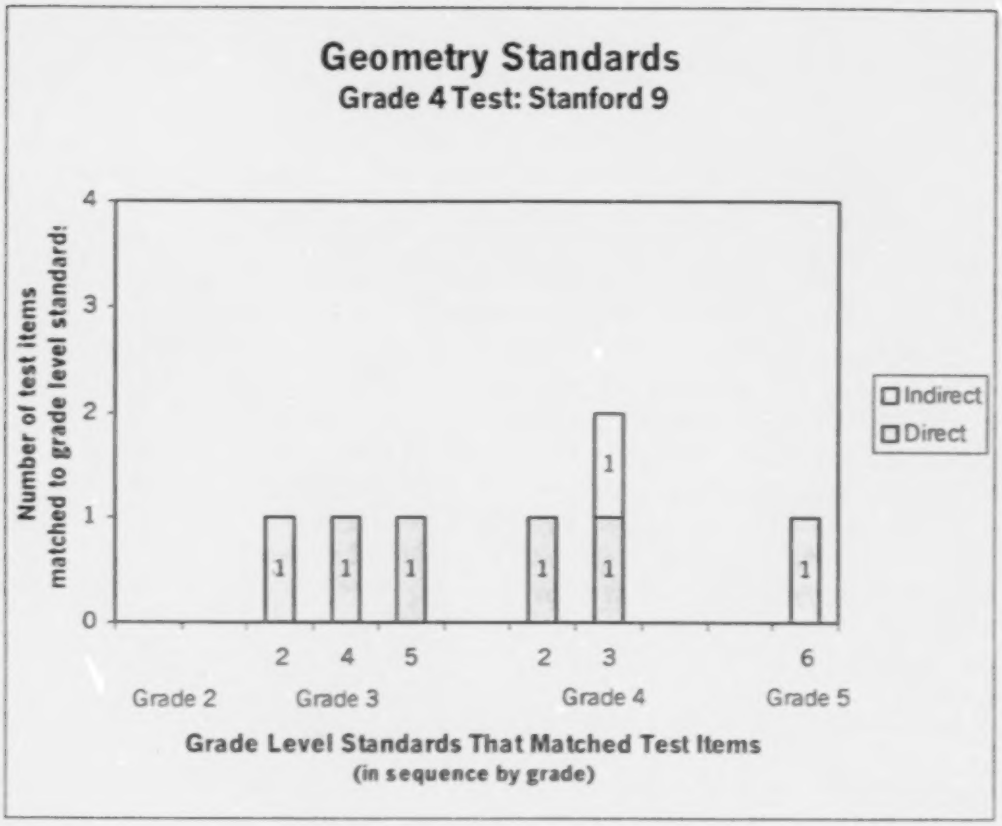
In the example above, matches were made between the listed grade level standard and the *Stanford 9* test for grade eight. In the Problem Solving subtest, item #8 was matched to the standard as well as item 10. In this example, the character of these items is described in two sentences just beneath the grade level standard.

Finally, any items that were declared a "miss," that is, could not be matched to a grade level standard, are characterized at the end of each appendix section. In addition to a list of the test items that could not be matched and a characterization of these items, a sample item from the test is provided.

Appendix B: Matches in Chart Form

Appendix B provides a graphical representation of the number of matches made between each Stanford test and the grade level standards. The frequency of matches of the test items to the grade level standards is represented by means of a bar graph. For example, Figure 3 shows the matches on the *Stanford 9* test for grade 4 (Intermediate 1) and the grade level standards related to Geometry. The sample chart shows that there were no matches for the grade 2 level standards related to Geometry; however, at grade 3, standards two, four, and five each were matched to one test item. Fourth grade standards numbered two and three each had one direct match with a test item. In addition, another test item was matched indirectly to standard number three in the 4th grade. Finally, one test item on the 4th grade test was matched to a standard at grade 5. (See Method of Item Matching for an explanation of the process.) This summary of matches is provided for all standards – Algebra; Geometry; Measurement; Patterns, Relations, & Functions; Statistics & Probability – and for all tested grades.

FIGURE 3



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SUMMARY OF RESULTS

As a result of this analysis, we can make a number of observations relative to how the test items on the *Stanford 9* address the South Dakota Standards in Mathematics. First, we address whether each test item can be matched to at least one grade level standard, in other words, whether the grade level standards address all the content found in the test. Next, we address whether any test items were matched to grade level standards *above* the grade level of the test. That is, do all students have adequate opportunity to learn the content for each test item before they are tested? Finally, we provide a summary table on the grade level standards that are not addressed by the achievement test.

Can each test item be matched to a grade level standard?
All of the test items in the grade 2 (Primary 2) and the grade 4 (Intermediate 1) tests were addressed by at least one grade level standard. In other words, all the knowledge and skill required to master each item on these two tests could be found described in the grade level standards. However, the grade 8 test had a total of five test items and the grade 11 test had a total of two test items that could not be matched to *any* mathematics grade level standard. This is a concern, for it suggests that students might not receive sufficient instruction to allow them to successfully answer items of this type. (These items are identified and described at the end of appendices A8 and A11, which address tests for grades 8 and 11 respectively. Consult the Table of Contents that is provided for each Appendix.)

*Are there test items matched to grade level standards **above** the grade level of the test?*
As described in the opening section of this report, analysts first sought to match test items to the standards of the corresponding grade. For example, they first sought to match items at the 4th grade test to the standards at grade four. If they failed to make a match, they next sought a match for one grade *below*, then two grades below. Before declaring a "miss," analysts attempted to match the item contents to the grade *above* the test grade. Two matches were made above grade level for items on the 2nd grade test. Three matches were made above grade level for items an the 4th grade test. (No such problems appeared for the test grades 8 or 11). Wherever such a match was required should be of some concern, for it indicates that students are being tested on content for which, according to the grade level standards, they have not yet received instruction. (These items are identified and described in Appendices A2 and A4. Consult the Table of Contents that is provided for these appendices.)

How many grade level standards are addressed by the Stanford 9?
Each appendix, A2 through A11, provides a summary set of grade level standards, with a mark indicating those standards that are addressed by the Stanford 9. A count of these standards is provide in Table 2.

TABLE 2

Stanford 9 Test (Total Number of Test Items)	Total Standards at the Tested Grade	Standards Matched to Test Items	% of Standards Matched to Test Items
Grade 2 (74)	61	19	31.1
Grade 4 (78)	62	15	24.2
Grade 8 (82)	74	16	21.6
Grade 11 (48)	113	15	13.3

Conclusion

It should be noted that it is not the purpose of this study to evaluate the effectiveness of the *Stanford 9* as an achievement test or as an assessment of the South Dakota standards. This is a descriptive report on the matches that were found to exist between items on selected *Stanford 9* tests and the South Dakota grade level standards in mathematics. We hope that this information will prove useful to policy makers and others who are engaged in the process of education reform.

APPENDIX A2

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Summary of Standards for Grade 2

Second Grade Algebra Standards

Students will:

1. identify number sentences that represent the inverse operation of given number sentences.
2.* apply the addition properties of zero and one in problem situations.
3.* describe the inverse relationship between addition and subtraction, write related equations, and solve. (example: 3+5 = 8, 8-5=3, 35 + _ = 47, 47 - 35 = _)
4. describe techniques used in adding and subtracting numbers. (example: 7 + 3 is the same as 5 + 3 + 2 and 18 + 8 is the same as18 + 2 + 6)
5. identify relevant and irrelevant information in the statements of problem situations.
6.* identify problem situations that match or do not match a given number sentence.
7. solve addition and subtraction problems using numberlines.
8. use informal methods to solve everyday problems requiring open sentences with one unknown.
9. use properties of addition and subtraction to devise algorithms (rule) or check results.
10. solve addition and subtraction problems using data from simple charts, picture graphs, and number sentences. (example: find the answer for 4 + X = ? when X = 2)

Second Grade Geometry Standards

Students will:

1.* identify and describe solid figures according to faces, edges, bases, and corners.
2. classify plane figures using sides and vertices.
3. compare plane and solid figures. (example: circle/sphere, square/cube, triangle/pyramid, rectangle/rectangular solid)
4.* compare plane figures to determine if objects are similar or congruent.
5.* identify geometric figures regardless of position and orientation in space.
6. use objects to perform geometric transformations including flips, slides, and turns.
7.* identify lines of symmetry in a variety of shapes and figures.

Second Grade Measurement Standards

Students will:

1.* measure time to the nearest five minute interval.
2. order events by time sequence; past, future, and equivalent periods of time.
3. use $, cent symbol, and decimal point appropriately when working with money.
4.* select an appropriate standard or non-standard unit to measure various objects and substances.
5. predict whether the measure will be greater or smaller when a different unit is used. (example: 3 dimes > a quarter)
6.* use appropriate tools and units of measure to solve problems.
7. use scales of length, weight, and volume within a measurement system.

8. record and compare various measurement situations. (example: temperature to the nearest degree, precipitation to the nearest inch)
9.* estimate and determine the area, perimeter, and volume of figures by covering them with squares, counting cubes, or base ten blocks.

Second Grade Number Sense Standards

Students will:

1.* count by number groups to 1000 or higher. (example: 3s, 4s, 5s, 10s, 20s)
2. associate verbal names, written word names, and standard numerals with whole numbers less than 1000.
3.* identify ordinal positions using ordered sets of objects.
4.* explain concept of even and odd numbers.
5. explore the concept of mixed numbers.
6.* solve two- and three-digit addition and subtraction problems.
7. estimate sums and/or differences of two whole numbers and find the answers using the appropriate methods of computing.
8. use models to explore addition and subtraction of fractions.
9. identify the correct usage of decimal point for decimals and money.
10. model problem situations in a variety of ways. (example: concrete materials, tables, charts, drawings, words)
11. estimate sums and differences of whole numbers and determine if a given estimate is correct.
12. solve story problems involving multi-step operations.
13. explain the strategies used to arrive at a solution to a problem.
14*. use words, models, and expanded notation to represent numbers with two or more digits.
15. compare and order fractions and decimals on a number line.
16* .understand relative size of whole numbers.
17. recognize relationships between common decimals and fractions. (example: ½ = 0.5)

Second Grade Patterns, Relations, and Functions Standards

Students will:

1. determine common attributes in a given group and identify those objects that do not belong.
2. use data to explain relationships. (example: plants grow taller with more hours of sunlight)
3. explain relationships present in a given set of data.
4* .find patterns and relationships in sequences of numbers. (example: doubles in learning addition; given three numbers, find the next number in the sequence)
5. write and solve number sentences from problem situations that express relationships.
6. describe and represent patterns that are growing and/or repeating.
7. represent patterns geometrically and numerically.
8. identify examples of continuous patterns.
9. identify examples of discrete patterns. (example: seasons, days of the week)

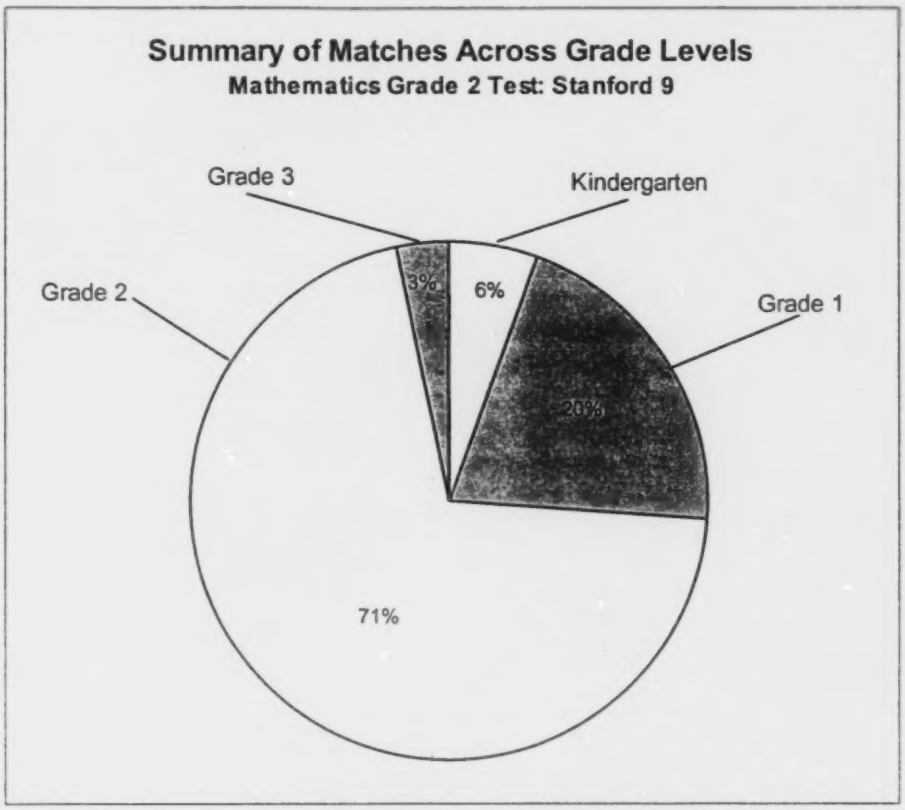
* GRADE-LEVEL STANDARDS MATCHED TO TEST ITEMS

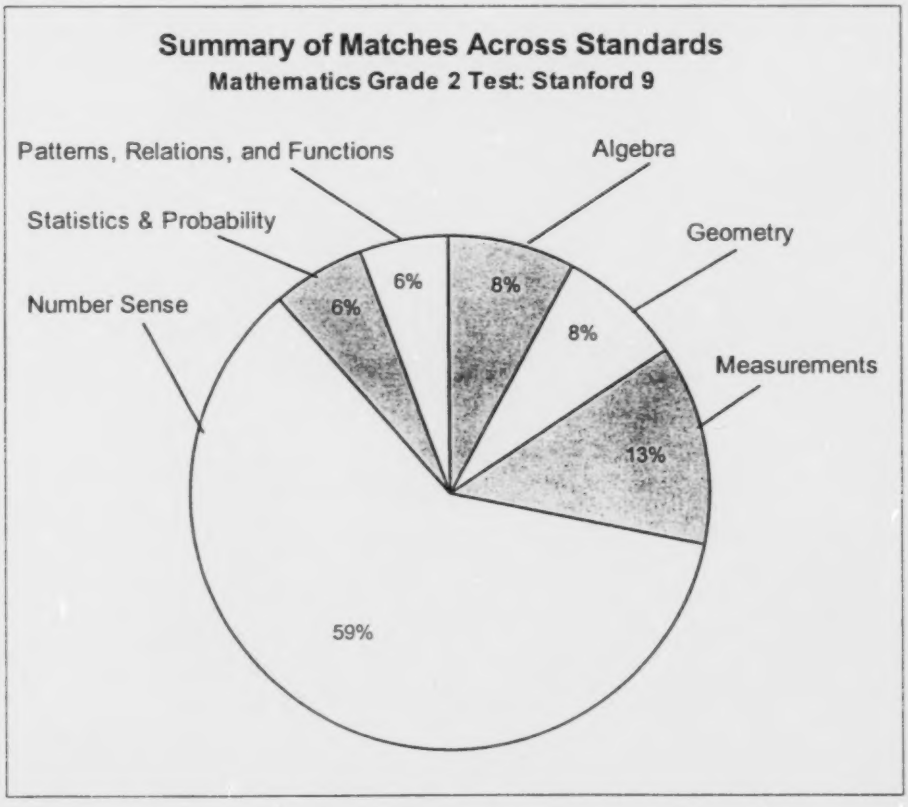
10. explore bounded relationships. (example: what is the largest possible sum of any two numbers from given set)

Second Grade Statistics & Probability Standards

Students will:

1. represent data sets in more than one way. (example: charts, line graphs, bar graphs)
2. identify features of data sets. (example: range, median, and mode)
3. determine if data collected is relevant and/or appropriate.
4. form questions about and generate explanations of data given in tables and graphs.
5. use concepts of chance and certainty to discuss the probability of actual events.
6. list all possible outcomes of probability experiments.
7. determine if common events are certain, likely, unlikely, or impossible.
8.* use spinners, tiles, and dice to predict which event is more likely to occur if an experiment is repeated.





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Grade 2: Matches and Descriptive Analysis

Kindergarten Measurement Standards
Students will:
2. explore and compare orientation in time. (example: yesterday, today, tomorrow, days, hours, minutes, weeks, months, years, seasons)

Students must read a calendar and identify the name of the day for a given date.

Grade 2 (Primary 2)
Problem Solving 35 (indirect)

6. compare objects or events using direct comparison according to a given attribute. example: length (longer/shorter), height (taller/shorter), volume (holds more/holds less)

Students must compare pictures of four objects and identify which is shortest.

Grade 2 (Primary 2)
Problem Solving 34

Kindergarten Statistics & Probability Standards
Students will:
3. describe and compare observable quantities of collected data. (example: the flavor of ice cream most people liked)

Students must read and interpret simple pictographs and two-column tables. Students are also required to count items in a pictograph.

Grade 2 (Primary 2)
Problem Solving 23, 24, 25

First Grade Algebra Standards
Students will:
3. identify number sentences that represent the commutative property of addition.

Students must solve a number sentence problem that requires them to use their understanding of the commutative property of addition.

Grade 2 (Primary 2)
Problem Solving 14

First Grade Geometry Standards
Students will:
4. describe proximity of objects in space. (example: near, far, up, down, below, beside)

Students must apply the terms "inside" and "outside" to geometric figures.

Grade 2 (Primary 2)
Problem Solving 46

First Grade Measurement Standards
Students will:
3. count and trade objects to explore the concept of equivalence. (example: how many nickels equal a quarter)

Students are presented with pictures of a small set of coins (e.g., two nickels) and must determine their total value.

Grade 2 (Primary 2)
Problem Solving 42

First Grade Number Sense Standards
Students will:
2. count objects in a given set and write the corresponding numeral.

Students are presented with words paired with tally marks and must select the word associated with a given total number of tally marks.

Grade 2 (Primary 2)
Problem Solving, 26

5. recall basic addition and subtraction facts through the 9s.

Students are presented with an open sentence of single digit numbers and must choose the answer that represents their sum.

Grade 2 (Primary 2)
Procedures 9, 10

6. select the appropriate operation to solve specific problems involving whole numbers.

Given a word problem, students must determine if the problem requires addition or subtraction and then solve the problem.

Grade 2 (Primary 2)
Problem Solving 25
Procedures 1-8

7. use fraction models to identify parts of a whole and parts of a group.

Students must recognize equivalent pictorial and numerical representations of fractions with denominators up to four.

Grade 2 (Primary 2)
Problem Solving 16, 17

First Grade Patterns, Relations, and Functions Standards
Students will:
4. describe or demonstrate the next element in repeating patterns. (example: rhythm, color, shape, and number patterns)

Students must be able to identify the next element in a simple repeating design.

Grade 2 (Primary 2)
Problem Solving 22

Second Grade Algebra Standards
Students will:
2. apply the addition properties of zero and one in problem situations.

Students must recognize that adding zero to a number does not change its value.

Grade 2 (Primary 2)
Problem Solving 13

3. describe the inverse relationship between addition and subtraction, write related equations, and solve. (example: 3 + 5 = 8, 8 - 5 = 3, 35 + _ = 47, 47 - 35 = _)

Students must write the corresponding subtraction equations for addition equations. They also must use inverse equations to solve addition problems with missing addends.

Grade 2 (Primary 2)
Problem Solving 11
Procedures 11, 12

6. identify problem situations that match or do not match a given number sentence.

Students must identify which number sentence matches a word problem.

Grade 2 (Primary 2)
Problem Solving 44

Second Grade Geometry Standards
Students will:
1. identify and describe solid figures according to faces, edges, bases, and corners.

Students must compare geometric figures based on the number of corners each figure has.

Grade 2 (Primary 2)
Problem Solving 32

4. compare plane figures to determine if objects are similar or congruent.

Students must compare two shapes to determine if they are similar. Students must know the names of standard figures (e.g., rectangle, triangle).

Grade 2 (Primary 2)
Problem Solving 29

5. identify geometric figures regardless of position and orientation in space.

Students must examine figures to determine which one is a rotation of the original object.

Grade 2 (Primary 2)
Problem Solving 31, 33

7. identify lines of symmetry in a variety of shapes and figures.

Students are to identify lines of symmetry in order to determine if figures are divided into matching halves.

Grade 2 (Primary 2)
Problem Solving 15, 30

Second Grade Measurement Standards
Students will:
1. measure time to the nearest five-minute interval.

Students must read an analog clock to the nearest five minutes.

Grade 2 (Primary 2)
Problem Solving 36

4. select an appropriate standard or non-standard unit to measure various objects and substances.

Students must select appropriate units of measure from a list for a given measurement situation.

Grade 2 (Primary 2)
Problem Solving 38

6. use appropriate tools and units of measure to solve problems.

Students must use rulers and nonstandard units to measure length.

Grade 2 (Primary 2)
Problem Solving 39, 40,41

Second Grade Number Sense Standards
Students will:
1. count by number groups to 1,000 or higher. (example: 3s, 4s, 5s, 10s, 20s)

Students must count by 3s and 10s to solve word problems.

Grade 2 (Primary 2)
Problem Solving 3, 46

3. identify ordinal positions using ordered sets of objects.

Presented with a set of objects, students must identify the ordinal position of an object.

Grade 2 (Primary 2)
Problem Solving 1

4. explain concept of even and odd numbers.

Students must recognize numbers as odd or even.

Grade 2 (Primary 2)
Problem Solving 10, 45

6. solve two- and three-digit addition and subtraction problems.

Students are presented with two- and three-digit addition and subtraction problems to solve. Some problems involve pictorial representations and word problems. Students must add three two-digit numbers.

Grade 2 (Primary 2)
Problem Solving 3, 5, 8, 24, 25
Procedures 1-8, 13-28

14. use words, models, and expanded notation to represent numbers with two or more digits.

Students must identify place value of digits and to write numbers given the place values of their digits.

Grade 2 (Primary 2)
Problem Solving 4 (Indirect), 6

16. understand relative size of whole numbers.

Students must recognize which numbers are larger or smaller in a set of numbers.

Grade 2 (Primary 2)
Problem Solving 7, 9, 45

Second Grade Patterns, Relations, and Functions Standards
Students will:
4. find patterns and relationships in sequences of numbers. (example: doubles in learning addition; given three numbers, find the next number in the sequence)

Presented with a numeric sequence, students must identify missing or additional terms.

Grade 2 (Primary 2)
Problem Solving 18-21

Second Grade Statistics & Probability Standards

Students will:

8. use spinners, tiles, and dice to predict which event is more likely to occur if an experiment is repeated.

Students must make predictions on which outcomes are most likely to occur using spinners and sets of objects.

Grade 2 (Primary 2)
Problem Solving 27, 28

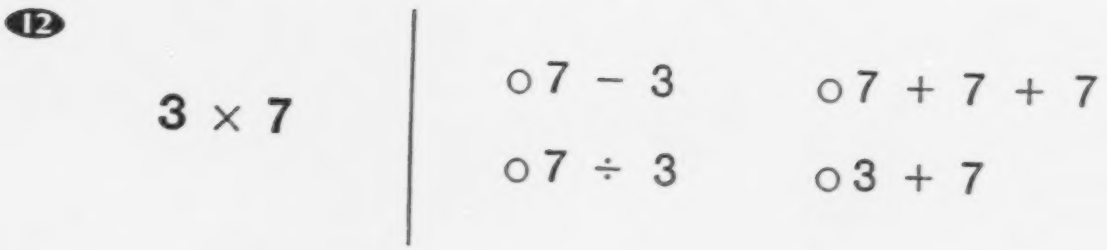
Note: The following characterizes test items that could only be matched to a grade-level standard that is one grade above the tested grade (see the section "Method for Matching" for a description of this process). Thus, the items characterized here might test students before they have had an opportunity to learn the knowledge and skills necessary to master these items.

Third Grade Algebra Standards
Students will:
2. explain the relationship between repeated addition and multiplication.

Students must recognize that multiplication is equivalent to repeated addition.

Grade 2 (Primary 2)
Problem Solving 12

12 **Go to Row 12. Mark next to another way to show three times seven.**



Third Grade Measurement Standards

2. describe time using the concepts of how long until, the duration of an event, and equivalent periods.

Presented with beginning and ending analog clock displays, students must determine elapsed time.

Grade 2 (Primary 2)
Problem Solving 37

37 **Look at Row 37. The first clock shows when Toshiro left home. The second clock shows when Toshiro came back home. How long was Toshiro gone?**

37

○ 1 hour ○ 4 hours

○ 20 minutes ○ 4 hours 20 minutes

3. count, compare, make change, and solve problems using a collection of coins and bills.

Students must count the value of a set of coins and make change.

Grade 2 (Primary 2)
Problem Solving 43

43 **Move down to Row 43. Shaneequa has the coins you see. She wants to buy the pencil. How much money will Shaneequa have left after she buys the pencil? Mark under your answer.**

2¢ ○ 10¢ ○ 11¢ ○ 15¢ ○

APPENDIX A4

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Summary of Standards for Grade 4

Fourth Grade Algebra Standards

Students will:

1.* relate the concepts of addition, subtraction, multiplication, and division to one another. (example: use of the associative, commutative, and distributive properties)
2. use appropriate terms in mathematical explanations. (example: divisor, dividend, quotient)
3. explore how to simplify numerical expressions involving addition, subtraction, multiplication, division, and parentheses.
4. create mathematical sentences that are true using three given numbers.
5. use tables to model and solve equations.
6. use the number line as a method to solve problems.
7. describe given problem situations in multiple ways.
8. use variables as place holders in number sentences. (example: m + w = 6; 3 * K = 12)
9.* write and solve number sentences that represent word problems.
10. use multiple methods to solve real-world problems involving equations and inequalities. (example: physical models and graphs)
11. explain the process used to simplify a three-step problem.
12. use models to explain how changing one variable causes a change in another. (example: area, perimeter)

Fourth Grade Geometry Standards

Students will:

1. investigate, describe, and identify the relationships between and among points, lines, line segments, and rays.
2.* determine if sides of plane figures, faces of solid objects, or edges of solid objects are the same size, parallel, or perpendicular.
3.* use appropriate geometric language to write descriptions of figures or pictures composed of geometric figures.
4. apply a variety of strategies and geometric properties of two- dimensional shapes to solve problems.
5. analyze geometric figures using size, shape, orientation, congruence, and similarity.
6. interpret or create scales on maps and drawings.
7. visualize and represent two-dimensional views of three-dimensional objects which are made from rectangular solids.
8. combine or take apart three-dimensional solids to construct new objects.

Fourth Grade Measurement Standards

Students will:

1. measure time using fractions. (example: fractions of an hour, fractions of a year)
2.* solve problems involving money. (example: use of proper notation, unit conversions, and

making change)

3. select and use the most appropriate units for given measurement situations.
4. carry out unit conversions within a system of measurement. (example: inches, feet, yards)
5. explore the use of formulas that assist in measurement situations. (example: area)
6.* use scales of length, temperature, volume, and weight for problem solving.
7.* measure length to the nearest eighth inch or to the nearest millimeter.
8. estimate and measure liquid volume in a variety of ways. (example: cups, pints, quarts, gallons, milliliters, liters)
9. develop strategies to make measurement estimates.

Fourth Grade Number Sense Standards

Students will:

1. find multiples and factors of numbers to 400.
2. identify and explain the meaning of square numbers and cube numbers.
3. interpret negative integers. (example: temperature, number line)
4. demonstrate that the value of a fraction is not changed when the numerator and denominator are multiplied by the same number.
5. apply multiplication and division facts through the 12s.
6.* find the products of multi-digit factors.
7.* find the quotient of two whole numbers.
8. use the four operations with fractions and decimals.
9. solve addition and subtraction problems using negative numbers.
10.* use and justify estimations in problems with whole numbers, fractions, decimals, and money.
11. identify the appropriate arithmetic operations in multi-step problem situations.
12. identify similarities within different problem-solving situations involving multiplication and division.
13. use a number line to compare numerical value of fractions or mixed numbers.
14.* read, write, order, and compare numbers from .001 to over 1,000,000.
15. associate verbal names, written word names, and the appropriate symbols in mathematical sentences.
16. describe the relative size of large numbers using various models and/or everyday representations.
17. use and interpret negative numbers in simple contexts.

Fourth Grade Patterns, relations, and Functions Standards

Students will:

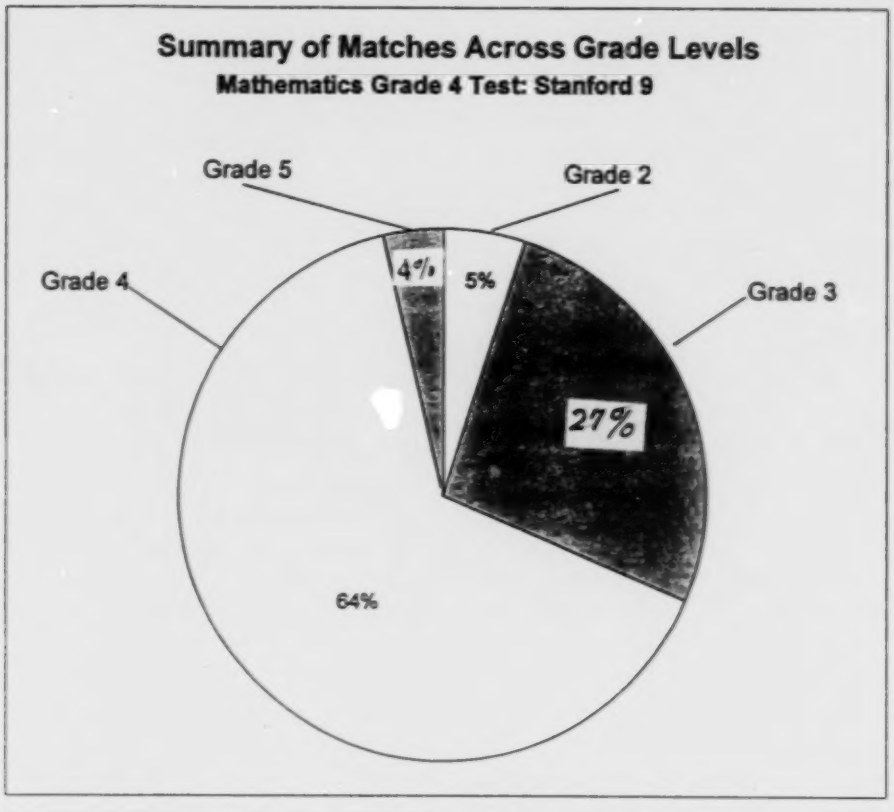
1. describe the concept of a variable (unknown quantity).
2. use the understanding that an equality relationship between two quantities remains the same as long as the same change is made to both quantities.
3. determine per unit cost based on number of units and the total cost.
4.* solve problems involving pattern identification and completion of patterns.

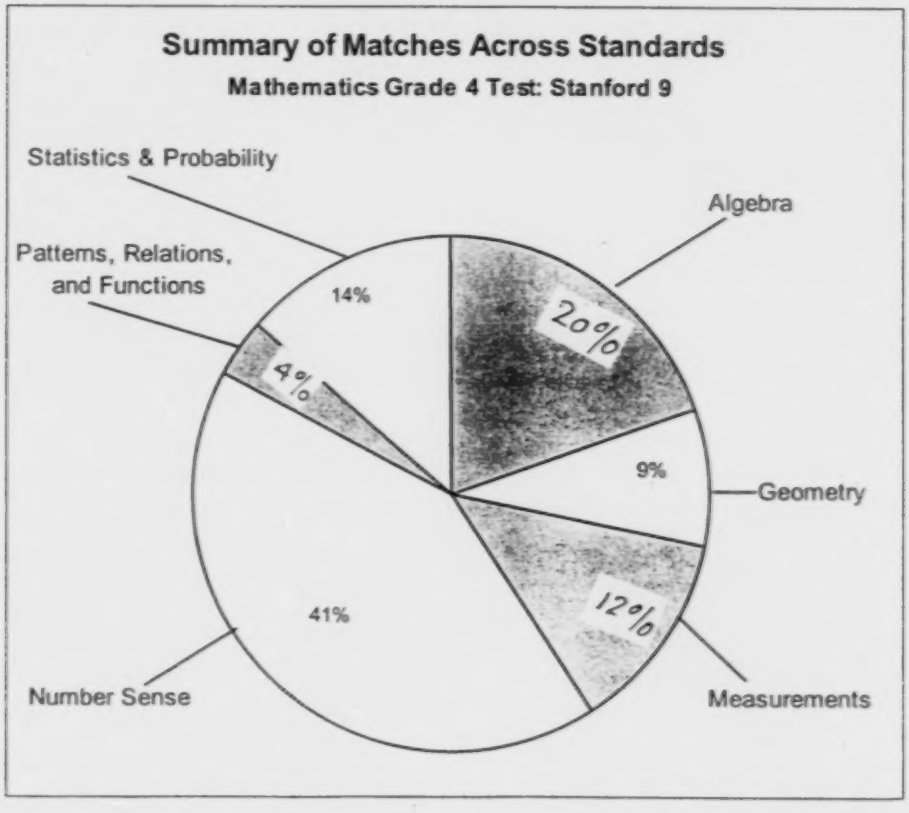
5. describe a rule for simple patterns.
6. analyze given patterns formed using concrete objects and pictures in order to create patterns with the same attributes.
7. determine all combinations or arrangements of a limited number of objects.
8. explain if there is a limit to what can be done in a given situation. (example: sharing 10 candy bars among 20 people. What is the maximum amount a given person could have?)

Fourth Grade Statistics & Probability Standards

Students will:

1. develop survey questions and systematically collect appropriate data.
2. use appropriate scales to represent data in various forms.
3.* interpret and analyze data from graphical representations and draw justifiable conclusions.
4. use mode, mean, median, and range to describe results and support predictions.
5. predict and represent possible outcomes for a simple probability situation in an organized manner. (example: tables, grids, tree diagrams)
6. analyze outcomes of probability for both individual and group experiments and report the results.
7. explain why unlikely events may occur fairly often in very large samples.
8.* determine the probability of simple events using a variety of materials. (example: coins, spinners, dice, computer programs)





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Grade 4: Matches and Descriptive Analysis

Second Grade Measurement Standards
Students will:
9. estimate and determine the area, perimeter, and volume of figures by covering them with squares, counting cubes, or base ten blocks.

Students must count unit blocks to determine area.

Grade 4 (Intermediate 4)
Problem Solving 37

Second Grade Number Sense Standards
Students will:
4. explain concept of even and odd numbers.

Students must recognize numbers as odd or even.

Grade 4 (Intermediate 4)
Problem Solving 5

14. use words, models, and expanded notation to represent numbers with two or more digits.

Students must identify the place value of digits and to write numbers, given place values. Students also must understand expanded notation.

Grade 4 (Intermediate 4)
Problem Solving 2, 6

Third Grade Algebra Standards
Students will:
1. solve problems involving numeric equations or inequalities.

Students must solve multiplication equations that include missing terms.

Grade 4 (Intermediate 4)
Procedures 5

5. identify special properties of 0 and 1 with respect to arithmetic operations.

Students must recognize that multiplying a number by 1 does not change it.

Grade 4 (Intermediate 4)
Problem Solving 9

Third Grade Geometry Standards
Students will:
2. identify and draw representations of line segments and angles using rulers or straightedges.

Students must identify congruent angles.

Grade 4 (Intermediate 4)
Problem Solving 28

4. predict, illustrate, and verify which figures could result from a flip, slide, or turn of a given figure.

Students must identify the result when an object has been flipped.

Grade 4 (Intermediate 4)
Problem Solving 30

5. demonstrate relationships between and among figures using symmetry, similarity, and congruence.

Students must identify whether letters of the alphabet are symmetrical.

Grade 4 (Intermediate 4)
Problem Solving 31

Third Grade Measurement Standards
Students will:
2. describe time using the concepts of how long until, the duration of an event, and equivalent periods.

Students must determine beginning time, given ending time and elapsed time.

Grade 4 (Intermediate 4)
Problem Solving 38

3. count, compare, make change, and solve problems using a collection of coins and bills.

Students must compare prices and identify the equivalent value of sets of coins.

Grade 4 (Intermediate 4)
Problem Solving 15, 32

7. measure and compare objects using measurable attributes.

Students must compare pictures of objects to determine which one is twice the length of a reference object.

Grade 4 (Intermediate 4)
Problem Solving 34

Third Grade Number Sense Standards
Students will:
2. name, represent, and write fractions and decimals.

Students must identify fractional parts of pictorial representations.

Grade 4 (Intermediate 4)
Problem Solving 12, 14

3. demonstrate that a mixed number is a whole number plus a fraction.

Presented with a pictorial representation, students must identify the correct mixed number.

Grade 4 (Intermediate 4)
Problem Solving 11 (indirect)

4. add and subtract multi-digit whole numbers using various computational methods.

Students must add and subtract numbers up to three digits.

Grade 4 (Intermediate 4)
Procedures 1-4

7. solve problems using addition, subtraction, and multiplication.

Students must solve word problems using addition.

Grade 4 (Intermediate 4)
Procedures 19

11. compare numerical value of fractions having like and unlike denominators.

Students must compare and order fractions with unlike denominators up to denominators of four.

Grade 4 (Intermediate 4)
Problem Solving 13

12. compare decimals expressed as tenths and hundredths.

Students must compare and order decimals through the hundredths. Problems may involve money.

Grade 4 (Intermediate 4)
Problem Solving 15

Third Grade Statistics & Probability Standards
Students will:
3. ask and answer relevant questions from data represented in charts, tables, and graphs.

Studentsmust extract information from tables. Students must order data based on size.

Grade 4 (Intermediate 4)
Problem Solving 3, 4, 13, 16, 18

6. use results of probability experiments to make predictions about future events.

Students must make predictions as to most likely outcomes based on simple probability experiments involving objects.

Grade 4 (Intermediate 4)
Problem Solving 25

Fourth Grade Algebra Standards
Students will:
1. relate the concepts of addition, subtraction, multiplication, and division to one another. (example: use of the associative, commutative, and distributive properties)

Students must use the commutative and associative properties to balance equations involving addition and subtraction.

Grade 4 (Intermediate 4)
Problem Solving 7, 8, 10

9. write and solve number sentences that represent word problems.

Given a word problem, students must create an expression that represents the problem and then find the solution.

Grade 4 (Intermediate 4)
Problem Solving 45, 46
Procedures 21, 23-30

Fourth Grade Geometry Standards

Students will:

2. determine if sides of plane figures, faces of solid objects, or edges of solid objects are the same size, parallel, or perpendicular.

Students must determine if the sides of figures are of the same length.

Grade 4 (Intermediate 4)
Problem Solving 27

3.use appropriate geometric language to write descriptions of figures or pictures composed of geometric figures.

Students must recognize and use the correct names for basic geometric figures (e.g., square, rectangle, triangle).

Grade 4 (Intermediate 4)
Problem Solving 26, 47 (indirect)

Fourth Grade Measurement Standards

Students will:

2. solve problems involving money. (example: use of proper notation, unit conversions, and making change)

Students must add money and make change.

Grade 4 (Intermediate 4)
Problem Solving 33
Procedures 20, 22

3. select and use the most appropriate units for given measurement situations.

Given possible measures and units, students must determine which one is most appropriate for the problem situation.

Grade 4 (Intermediate 4)
Problem Solving 41

6. use scales of length, temperature, volume, and weight for problem solving.

Students must answer questions based on the Fahrenheit temperature scale. Students must read thermometers and identify temperature difference as well as the most likely temperature.

Grade 4 (Intermediate 4)
Problem Solving 39, 40

7. measure length to the nearest eighth inch or to the nearest millimeter.

Students must use rulers to measure length. Their answers must be given to the nearest half inch or centimeter.

Grade 4 (Intermediate 4)
Problem Solving, 35, 36

Fourth Grade Number Sense Standards
Students will:
6. find the products of multi-digit factors.

Student must perform multiplication with two- and three-digit numbers.

Grade 4 (Intermediate 4)
Procedures 6-9

7. find the quotient of two whole numbers.

Students must divide two- and three-digit dividends by one- and two-digit divisors.

Grade 4 (Intermediate 4)
Procedures 10-15

10. use and justify estimations in problems with whole numbers, fractions, decimals, and money.

Students must estimate whole number values and money amounts. They also must round numbers to a specified place.

Grade 4 (Intermediate 4)
Problem Solving 42-44
Procedures 16-18

14. read, write, order, and compare numbers from .001 to over 1,000,000.

Students must order numbers up to the thousands place. Given a number, students must write the number using words.

Grade 4 (Intermediate 4)
Problem Solving 1, 3, 4, 6 (indirect)

Fourth Grade Patterns, Relations, and Functions Standards
Students will:
4. solve problems involving pattern identification and completion of patterns.

Students must identify the next element in simple numeric and pictorial patterns.

Grade 4 (Intermediate 4)
Problem Solving 17-19

Fourth Grade Statistics & Probability Standards
Students will:
3. interpret and analyze data from graphical representations and draw justifiable conclusions.

Given a graph or chart, studentsmust analyze the data to answer questions.

Grade 4 (Intermediate 4)
Problem Solving 20-23

8. determine the probability of simple events using a variety of materials. (example: coins, spinners, dice, computer programs)

Students must identify the most likely outcome of spinning a spinner that is divided into unequal sections.

Grade 4 (Intermediate 4)
Problem Solving 24

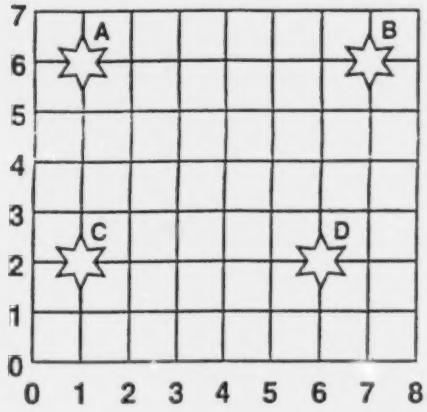
Note: The following characterizes test items that could only be matched to a grade-level standard that is one grade above the tested grade (see the section "Method for Matching" for a description of this process). Thus, the items characterized here might test students before they have had an opportunity to learn the knowledge and skills necessary to master these items.

Fifth Grade Geometry Standards
Students will:
6. use two-dimensional coordinate grids to find locations and represent points and simple figures.

Students must identify the coordinates of objects on a coordinate grid.

Grade 4 (Intermediate 4)
Problem Solving 29

29 **The graph shows the location of some stars.**



Which star is located at (6, 2)?

A A
B B
C C
D D

Fifth Grade Number Sense Standards
Students will:
3. use place-value concepts of grouping based upon powers of ten within the decimal number system.

Students must identify the place value of digits.

Grade 4 (Intermediate 4)
Problem Solving 16

16 **In football, every time a player carries the ball an average is kept on the number of yards he runs.**

Player	Average Yards Per Carry
Tony	5.567
Archie	6.125
Paul	5.651
Steve	3.956

Which player has an average with a 6 in the hundredths place?

F Tony
G Archie
H Paul
J Steve

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13. solve problems using non-routine strategies.

Students must use logical reasoning to solve nonstandard problems.

Grade 4 (Intermediate 4)
Problem Solving 48

48 **If you switched 2 numbers, these 3 subtraction problems would all have the same answer.**

9 − 5 =	10 − 4 =	8 − 6 =

Which 2 numbers should be switched?

F 4 and 5
G 5 and 6
H 4 and 6
J 4 and 8

APPENDIX A8

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Summary of Standards for Grade 8

Eighth Grade Algebra Standards

Students will:

1.* apply properties of equalities and inequalities using algebraic techniques.
2.* use equalities and inequalities to life-related situations.
3. use properties to justify the steps to expand, combine, or simplify polynomial expressions.
4. analyze products of binomials using area models. (example: $(x + 3)(x - 2)$
5. analyze linear equations to create generalizations.
6.* solve and graph equations and inequalities.
7. represent solutions to open sentences and inequalities graphically.
8.* describe and represent relations from collected data using tables, graphs, and rules.
9. solve multi-step linear equations using strategies involving inverse operations and integers.
10. determine slope from a graph, ordered pairs, or an equation.
11. identify x and y intercepts from an equation or graph.
12. generalize the impact of coefficients and constants of linear equations.
13. identify various phenomena that represents different families of graphs.
14. solve word problems involving direct and inverse variation.

Eighth Grade Geometry Standards

Students will:

1.* use given assumptions to determine properties of figures and relationships between figures.
2.* use visual perspectives to analyze geometric problems.
3. describe, classify, and construct plane and solid figures. (example: prisms, pyramids, cylinders, and cones)
4. use the Pythagorean Theorem to solve problems.
5. use various geometric properties, formulas, and relationships to solve problems involving three-dimensional shapes.
6. use given top, side, or bottom views of objects to construct three-dimensional models.
7. construct three-dimensional figures from two-dimensional views.
8. develop two-dimensional representations that demonstrate various perspectives of three-dimensional objects.
9. determine volume and surface area of three-dimensional models.

Eighth Grade Measurement Standards

Students will:

1.* apply proportional reasoning to solve measurement problems.
2. design procedures for measuring various attributes of complex figures.
3.* develop and use standard formulas for surface area and volume.

4. estimate and determine volume using standard and nonstandard units.
5.* use degrees as a unit of measure for angles and circle problems.
6. develop rules to use when converting between different measurement systems.
7. use the most appropriate tool to measure volume in customary and metric systems.
8. determine precision, accuracy, and measurement errors in a variety of situations.
9. apply mathematical techniques in situations that defy direct measurement. (example: measuring the height a of tree, distance to the moon)
10. solve problems involving two- and three-dimensional measurement situations in everyday contexts.
11. use volume and surface area formulas to solve problems.

Eighth Grade Number Sense Standards

Students will:

1.* represent numbers in a variety of equivalent forms. (example: radicals, absolute value)
2. describe relationships between the subsets of the real number system.
3. explain the use of irrational numbers. (example: pi)
4. use concrete representations of real numbers in daily situations.
5.* simplify numerical expressions involving exponents.
6. use proportions to solve scale-model problems with fractions and decimals.
7. determine a relative position of a square root on a number line.
8.* read, write, and compute within any subset of real numbers.
9.* read, write, and explain exponential notation.
10.* use estimation strategies to predict results and help solve multi-step problems involving real numbers.
11. formulate rules to solve practical problems involving real numbers.
12. use properties to justify steps when simplifying expressions.
13. create algorithms to determine solutions for equations and inequalities.
14. formulate counter-examples to disclaim given assertions.
15. explain the magnitude of radicals, numbers expressed with exponents, and the absolute values of numbers.
16.* associate mathematical symbols with word names of real numbers.
17. explain the effects of operations on the magnitude of real numbers.

Eighth Grade Patterns, Relations, and Function Standards

Students will:

1. construct problems involving dependent and independent variables.
2. represent and interpret quantitative relationships graphically.
3. understand the relationship of solutions in one variable, the x-intercept of the related linear equation in two variables, and the related situations from which each arise.
4. create rules to explain the relationship between numbers when a change in the first variable affects the second variable.
5. represent situations with patterns and relations to find exact or approximate solutions to

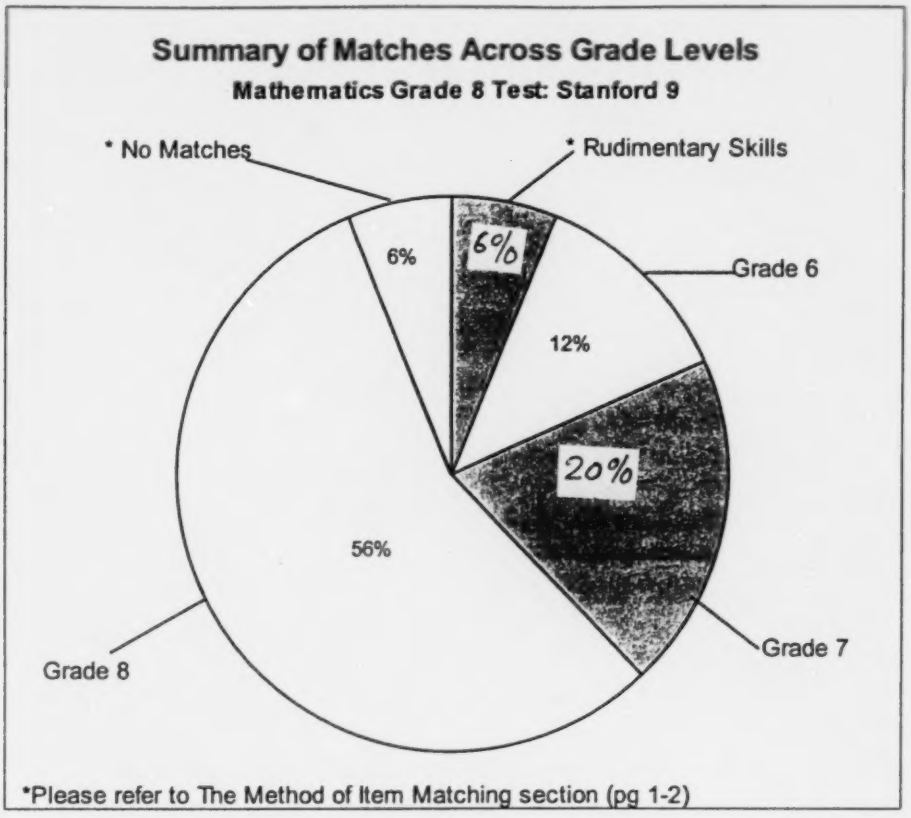
problems.

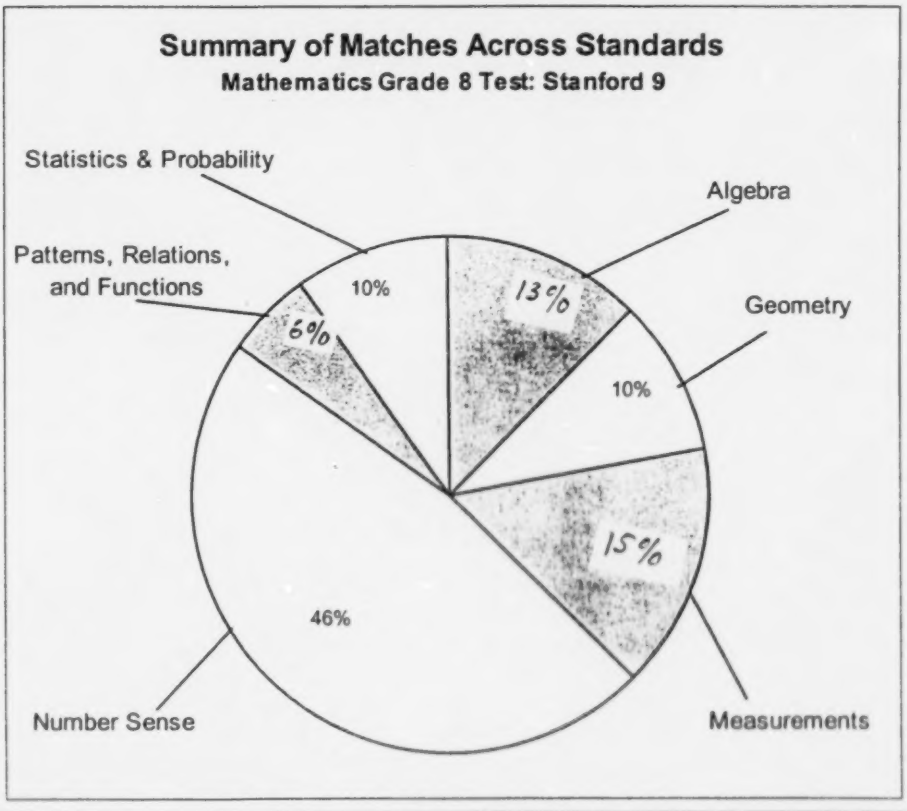
6. investigate and describe functional relationships of geometric figures. (example: area is the function of the radius)
7. describe and represent relations using tables, graphs, and rules.
8.* create and solve problems using proportions, formulas, and functions.
9. identify, describe, represent, extend, and create exponential patterns. (example: the accumulation of a unit of money [penny] over time)
10. identify the special characteristics of relationships including maximum and minimum values.
11. differentiate between continuous and discrete functions.
12. use exponential growth or decay to explore exponential functions.
13. explain the concept of limit using various representations. (example: 1 + ++ . .)

Eighth Grade Statistics and Probability Standards

Students will:

1. explain impact of sampling bias on data and describe procedures for selecting unbiased samples.
2. create and solve problems involving the mean, median, mode and range of a set of data.
3. consider effects on reliability of sampling procedures and of missing or incorrect information.
4. use a variety of visual representations to display data to make comparisons, predictions, and inferences.
5. evaluate the validity of claims based on statistical data.
6. establish appropriate sample spaces to apply principles of probability for simple and compound chance events.
7. express theoretical probability of experimental outcomes.
8. estimate probability of simple and compound events using a series of trials.
9. explain the difference between independent and dependent events and the impact on results in specific probability situations.
10. determine and interpret the probability of a given event occurring from a given sample space.





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Grade 8: Matches and Descriptive Analysis

Sixth Grade Algebra Standards
Students will:
10. use variables to represent given quantities in problem situations.

Given a description of an operation on an unknown quantity, students must correctly symbolize a written statement.

Grade 8 (Advanced 8)
Problem Solving 13

Sixth Grade Geometry Standards
Students will:
6. explore ways that shapes can be combined, subdivided, and changed using geometric concepts of symmetry, reflections, congruency, similarity, perpendicularity, and parallelism.

Students must identify whether letters of the alphabet contain parallel line segments.

Grade 8 (Advanced 8)
Problem Solving 33

7. identify and plot ordered pairs in all four quadrants of the rectangular coordinate system.

Students must identify the coordinates of a point needed to complete the vertices of a square.

Grade 8 (Advanced 8)
Problem Solving 30

Sixth Grade Measurement Standards
Students will:
2. convert units of measure within a measurement system.

Given a distance measured in meters, students must convert the distance into kilometers.

Grade 8 (Advanced 8)
Problem Solving 37

5. use the most appropriate tool to measure length, temperature, and angle in customary and metric systems.

Students must measure centimeters and inches with rulers. Problems may require students to use formulas and map scales.

Grade 8 (Advanced 8)
Problem Solving 34, 38

Sixth Grade Number Sense Standards
Students will:
1. represent numbers in a variety of equivalent forms. (example: fractions, decimals, percents)

Students must identify which fraction from a list is closest to a given percentage.

Grade 8 (Advanced 8)
Procedures 12

14. identify, represent, compare, and order rational numbers and represent them on a number line.

Students must locate numbers (including negative numbers) on a number line.

Grade 8 (Advanced 8)
Problem Solving 5

Sixth Grade Patterns, Relations, and Functions Standards
Students will:
4. recognize, describe, and extend a variety of numeric and geometric patterns.

Students must determine additional terms in Pascal's triangle.

Grade 8 (Advanced 8)
Problem Solving 17

Sixth Grade Statistics & Probability Standards
Students will:
5. represent all possible outcomes for compound events in an organized manner. (example: tables, tree diagrams)

Students must solve problems by counting the number of possible outcomes.

Grade 8 (Advanced 8)
Problem Solving 20

Seventh Grade Algebra Standards
Students will:
8. create algebraic statements representing patterns observed in life-related situations.

Presented with a word problem, students must identify the additional information needed to find a solution.

Grade 8 (Advanced 8)
Problem Solving 48

Seventh Grade Geometry Standards
Students will:
3. identify and construct elements of geometric figures. (example: altitudes, midpoints, bisectors, radii, diameters, and chords)

Presented with the lengths of four chords of a circle, one of which goes through the center, students must identify the length of the diameter.

Grade 8 (Advanced 8)
Problem Solving 32

4. use geometric properties, formulas, and relationships to solve problems involving regular and irregular shapes.

Given the radius of a circle, students must calculate the circumference.

Grade 8 (Advanced 8)
Problem Solving 36

9. use the rectangular coordinate system to analyze connections between stretching, shrinking, and transforming figures.

Students must compare the sliding of figures on a coordinate grid.

Grade 8 (Advanced 8)
Problem Solving 31

Seventh Grade Measurement Standards
Students will:
2. create scale drawings to represent real-world situations.

Students must select the appropriate scale to use for a drawing.

Grade 8 (Advanced 8)
Problem Solving 47

3. develop and use standard formulas for perimeter, area, and circumference.

Students must use standard formulas to calculate the area of a triangle and the area and circumference of a circle.

Grade 8 (Advanced 8)
Problem Solving 34-36

Seventh Grade Number Sense Standards
Students will:
9. develop and apply properties of proportions to solve problems.

Students must create ratios to solve problems. Students must use percentages to calculate markdowns and to express parts of a whole set.

Grade 8 (Advanced 8)
Procedures 16, 29, 30

15. compare and order sets of numbers expressed in multiple forms.

Students must compare fractions expressed with different denominators. Students also must compare fractions and decimals.

Grade 8 (Advanced 8)
Problem Solving 1-3

Seventh Grade Patterns, Relations, and Functions Standards
Students will:
5. compute an "output" for a given "input" in a function.

Presented with a numeric pattern, students must determine the function that describes it and calculate additional outputs.

Grade 8 (Advanced 8)
Problem Solving 16

7. generalize numerical and geometric patterns using algebra and relate the equation, graph, and table of values for the generalization.

Students must generalize numeric patterns to find additional terms.

Grade 8 (Advanced 8)
Problem Solving 17

Eighth Grade Algebra Standards
Students will:
1. apply properties of equalities and inequalities using algebraic techniques.

Students must use algebra to symbolize and solve numeric problems.

Grade 8 (Advanced 8)
Problem Solving 16

2. use equalities and inequalities to life-related situations.

Students must create equalities based on problem situations. Equations may involve money.

Grade 8 (Advanced 8)
Problem Solving 12, 13

6. solve and graph equations and inequalities.

Students must solve equalities and inequalities and to evaluate expressions. Some problems may involve money.

Grade 8 (Advanced 8)
Problem Solving 11, 14, 15

8. describe and represent relations from collected data using tables, graphs, and rules.

Students must answer questions based on information presented in a scatterplot.

Grade 8 (Advanced 8)
Problem Solving 26

Eighth Grade Geometry Standards
Students will:
1. use given assumptions to determine properties of figures and relationships between figures.

Given three vertices, students must use the properties of a square to determine the coordinates of the last vertex.

Grade 8 (Advanced 8)
Problem Solving 30

2. use visual perspectives to analyze geometric problems.

Students must compare the number of faces of three-dimensional shapes represented two-dimensionally.

Grade 8 (Advanced 8)
Problem Solving 29

Eighth Grade Measurement Standards
Students will:
1. apply proportional reasoning to solve measurement problems.

Students must use proportions to solve measurement problems.

Grade 8 (Advanced 8)
Problem Solving 40, 41

3. develop and use standard formulas for surface area and volume.

Given the dimensions of a rectangular solid, students must calculate the volume.

Grade 8 (Advanced 8)
Problem Solving 28

5. use degrees as a unit of measure for angles and circle problems.

Students must estimate the size of an angle.

Grade 8 (Advanced 8)
Problem Solving 39

Eighth Grade Number Sense Standards
Students will:
1. represent numbers in a variety of equivalent forms. (example: radicals, absolute value)

Students must divide the numerator of a fraction by its denominator to find the fractional equivalent.

Grade 8 (Advanced 8)
Problem Solving 2

5. simplify numerical expressions involving exponents.

Students must compare exponentials having different bases and powers.

Grade 8 (Advanced 8)
Problem Solving 10

8. read, write, and compute within any subset of real numbers.

Students must compute with all real numbers (i.e., integers, decimals, fractions). Some problems require students to select the appropriate operation.

Grade 8 (Advanced 8)
Problem Solving 6
Procedures 8, 13-15, 17-28

9. read, write, and explain exponential notation.

Students must convert between scientific notation and standard form of numbers. Students must understand how to change exponential base to solve problems.

Grade 8 (Advanced 8)
Problem Solving 8, 10

10. use estimation strategies to predict results and help solve multi-step problems involving real numbers.

Students must use rounding to estimate answers to story problems.

Grade 8 (Advanced 8)
Problem Solving 42-45

16. associate mathematical symbols with word names of real numbers.

Students must identify place value of digits.

Grade 8 (Advanced 8)
Problem Solving 7

Eighth Grade Patterns, Relations, and Functions Standards
Students will:
8. create and solve problems using proportions, formulas, and functions.

Students must create proportions to solve word problems.

Grade 8 (Advanced 8)
Problem Solving 18

Eighth Grade Statistics & Probability Standards
Students will:

2. create and solve problems involving the mean, median, mode and range of a set of data.

Given a list of data, students must calculate the mean.

Grade 8 (Advanced 8)
Problem Solving 27

4. use a variety of visual representations to display data to make comparisons, predictions, and inferences.

Students must read and interpret pie charts, bar graphs, tally charts, and stem-and-leaf charts.

Grade 8 (Advanced 8)
Problem Solving 19, 22, 23, 25

10. determine and interpret the probability of a given event occurring from a given sample space.

Given a stem-and-leaf chart, students must express the probability of an event occurring as a fraction.

Grade 8 (Advanced 8)
Problem Solving 24

Test Items Not Matched to Any Standard

Students must apply logical reasoning to problems involving numeric patterns, quantitative relations, and matching items in sets.

Grade 8 (Advanced 8)
Problem Solving 49-52

51 **Larry, Bob, Gale, and John were each wearing different-colored sweatshirts. The colors are red, green, blue, and yellow. Neither Gale nor Bob ever wears green, and neither Larry nor Gale ever wears yellow. John wore blue. What color was each person's sweatshirt?**

A John-blue; Gale-green; Larry-yellow; Bob-red

B John-blue; Gale-red; Larry-yellow; Bob-green

C John-blue; Gale-yellow; Larry-red; Bob-green

D John-blue; Gale-red; Larry-green; Bob-yellow

Given a random sample, students must determine the most likely composition of the original population.

Grade 8 (Advanced 8)
Problem Solving 21

21 **A box had an unknown number of black marbles and 20 white marbles in it.**

The box was shaken to mix the marbles. The 30 marbles below were drawn from the box at the same time and at random.

Which is most likely the number of *black* marbles that were *originally* in the box?

A 100
B 80
C 60
D 40

APPENDIX A11

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Test items not matched to any standard	A11-14

Summary of Standards for Grades 9-12

Grades 9-12 Algebra Standards

Students will:

1. select, justify, and apply a technique to solve quadratic equations over the set of complex numbers and interpret the results graphically.
2. analyze the relationships among the coefficients, factors, and roots of polynomials.
3. apply commutative, associative, distributive, identity, and inverse properties when combining functions.
4. use matrices to organize and manipulate data, including matrix addition, subtraction, and scalar multiplication.
5. analyze various expressions which emphasize the distributive property. (example: 3(x+2); (x3 – 4x2 + 3x + 1)(x2 - 2x + 3))
6. explain the logic of algebraic procedures.
7. extend the concepts of algebra to other types of functions. (example: trigonometric, exponential, and logarithmic)
8. apply recursive formulas to express iterative patterns of change including those of exponential growth and decay. (example: mortgages, investment returns)
9.* determine roots of polynomial functions including complex roots.
10.* determine equations for lines meeting certain conditions.
11. use inductive reasoning to test and prove that a formula is correct.
12. explore and develop procedures to identify the real roots of polynomial functions.
13. determine the solution of systems of equations in multiple ways.
14. solve problems using the quadratic formula including graphic representation and analysis.
15. analyze the binomial theorem.
16. solve linear-quadratic and quadratic-quadratic systems of equations algebraically and graphically.
17.* derive procedures for determining critical features of circles, ellipses, hyperbolas, or parabolas given equations in standard form.
18. use matrices to investigate networks and graphs.
19.* create algebraic models to represent problem situations.
20. compare quadratic growth with linear and exponential growth.
21. explain the graphical impact of the xy term in a quadratic equation.
22. graph and interpret complex numbers in vector and polar form.
23.* build formulas representing patterns that are algebraic, trigonometric, logarithmic and exponential.
24. find sums, differences, scalar products, dot products, and norms of vectors noting properties which apply.
25. determine, interpret, and use a unit directional vector, perpendicular components, and norms to express vectors in the coordinate plane.

* GRADE-LEVEL STANDARDS MATCHED TO TEST ITEMS

Grades 9-12 Geometry Standards

Students will:

1.* know, use, derive formulas for, and solve problems involving perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.
2. prove the properties of geometric figures using algebraic and deductive proofs.
3. justify conjectures pertaining to geometric figures.
4. use given information to deduce properties of and relationships between figures.
5.* explore and analyze the properties of triangles.
6. investigate and identify congruence and similarity relationships among triangles.
7. determine the values of the six trigonometric functions of angles in standard position.
8.* investigate and use properties of angles, arcs, chords, tangents, and secants to solve problems.
9.* identify, create, and solve practical problems involving triangles and vectors.
10. build three-dimensional figures from two-dimensional shapes or drawings.
11. draw two-dimensional drawings of three-dimensional objects from various perspectives.
12. build three-dimensional objects to scale.
13. use matrices to translate, reflect, rotate, or scale polygonal figures represented on the coordinate plane.
14. use graphing tools to study transformations. (example: congruence using rigid motion, similarity using magnification of images)
15.* select transformations required to map images of objects.
16. use proportions to solve problems.
17. identify, create, and solve practical problems using a system of vectors and their horizontal and vertical components.
18. represent situations using the properties of coordinate geometry to answer pertinent questions.

Grade 9-12 Measurement Standards

Students will:

1. investigate and explain the relationships between linear, square, and cubic measures and describe how changes in one of the measures of an object affect the others.
2. analyze unit combinations to check answers. (example: feet per second)
3.* use quotient units of measure and relate them to slope. (example: speed, density)
4. derive and use formulas for solving problems involving measurements.
5.* develop units or combinations of units for a given situation or application.
6. create tools or applications processes to solve problems that defy direct measurement.
7. use the concept of significant digits in giving answers to an appropriate degree of accuracy.
8. create tools or application processes to improve accuracy or minimize error in measurement situations.
9. analyze specific measurement situations to determine necessary degree of accuracy and/or allowable error tolerance.
10. identify the structural parts and characteristics of objects to answer questions about them.

* GRADE-LEVEL STANDARDS MATCHED TO TEST ITEMS

(example: a penny can be seen as a cylinder with a small height so its volume is V=P r2h)

11. solve measurement problems involving perimeter, area, volume, and mass of irregularly-shaped objects.

Grades 9-12 Number Sense Standards

Students will:

1. describe the structure of the real number system and related subsets.
2. apply properties and axioms of the real number system to various subsets. (example: axioms of order, closure)
3. understand that real numbers can be represented in a variety of forms. (example: integers, fractions, decimals, percents, scientific notation, exponents, radicals, absolute value, logarithms)
4. describe the relationship of the real number system to the complex number system.
5. explain the meaning of the number e.
6. add, subtract, multiply, and divide algebraic expressions.
7. evaluate algebraic expressions.
8.* add, subtract, multiply, and divide real numbers including roots and exponents using appropriate computational strategies. (example: mental mathematics, paper and pencil, calculator)
9. explain the effects of arithmetic operations on real numbers. (example: roots, exponents, and inverse relationships)
10. analyze and describe fractional exponents. (example: 103/4)
11. analyze the decimal representation of numbers. (example = .33333…., .010010001. . .)
12. add, subtract, multiply, divide, and simplify expressions containing fractional exponents.
13. use estimation strategies in complex situations to predict results and to check the reasonableness of results.
14. select and justify alternative strategies. (example: use properties of numbers that allow operational shortcuts for computational procedures)
15.* apply properties of arithmetic and geometric sequences and series to solve problems. (example: write the first n terms, find the nth term, evaluate summation formulas)
16. use logic strategies to develop and defend mathematical arguments.
17. understand and use basic concepts of infinity and limits.
18. compare, contrast, and extend arithmetic and geometric patterns of growth and use them to make predictions about events for which there is no data.
19. understand the relative size of sets of rational numbers and irrational numbers.
20. describe impact of increasing powers on products and quotients.
21. apply operations to numbers expressed in scientific notation.

Grades 9-12 Patterns, Relations, and Functions Standards

Students will:

1.* use various representations of functions. (example: graphs, tables, symbolic forms)
2. analyze direct and inverse relations to determine their characteristic patterns.
3.* apply transformations to the graph of a basic function and predict and analyze the results.

4.* determine the domain, range, zeros, y-intercepts, end behavior, relative maximum and minimum points, and symmetry of functions.
5. demonstrate and explain the effects that changing coefficients and/or constants has on the graph of a function.
6. use a graph of a function to find the graph of the inverse function.
7. determine the restrictions that must be placed on the domain and range of a relation for it to be a function.
8. create tables or graphs to interpret relations and/or functions.
9. create geometric and numerical patterns that model relations and/or functions.
10.* determine which type of function best models a situation, write an equation, and use this equation to answer questions about the situation.
11. use laws of logarithms to simplify expressions and solve equations involving logarithms and exponents.
12. analyze the relationship between exponential and logarithmic functions.
13. graph various parametric polar equations.
14. identify natural phenomena that are cyclic.
15. apply special number relationships such as sequences and series to real-world problems.
16.* compare, contrast, and extend arithmetic and geometric patterns of growth and use them to make predictions.
17.* determine and use recursive formulas to express iterative patterns of change including those of exponential growth and decay.
18. use concepts of infinity and limits to solve problems.
19. use successive approximation techniques to solve problems.
20. apply limits of geometric series to problem situations.
21. use iteration and recursion to evaluate problem situations.
22. solve equations that include both infinite solutions and restricted domain solutions.
23. estimate the limit of a given infinite sequence.

Grades 9-12 Statistics & Probability Standards

Students will:

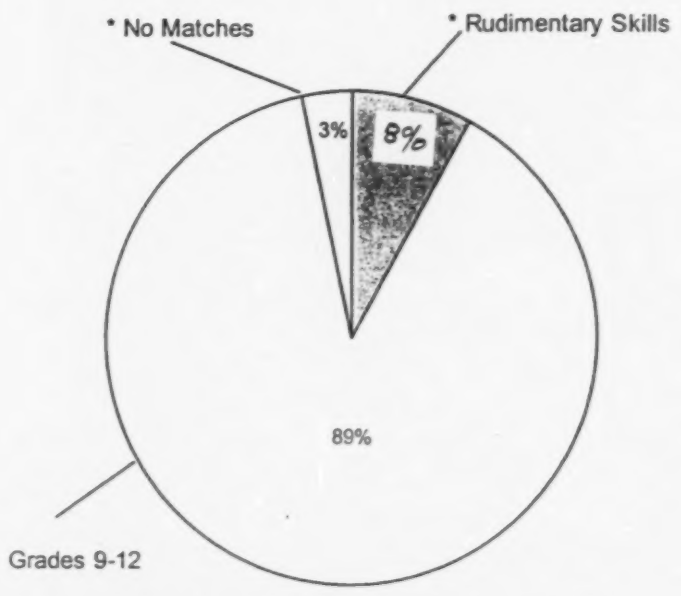
1.* analyze and evaluate surveys and experiments conducted by others. (example: bias, randomness, analysis, interpretation)
2. create, implement, and defend a plan for gathering data to answer relevant questions.
3. compare multiple one-variable data sets, using statistical techniques including measures of central tendency and dispersion.
4. calculate measures of central tendency and dispersion for complex sets of data.
5. demonstrate how statistical analysis can quantify variability.
6.* describe the normal curve and use it to predict percentiles and probabilities.
7.* use scatterplots, regression lines, and correlation coefficients to model data and support conclusions.
8.* determine probabilities using counting procedures, tables, tree diagrams, and formulas for permutations and combinations.
9.* determine probability of compound, complementary, independent, and dependent events.

10. evaluate effectiveness and accuracy of the model in respect to the theoretical probability.
11. design, implement, and interpret simulations to estimate probabilities of events.
12. determine probability using given graphs of distributions or table of outcomes.
13.* predict outcomes of simple and compound events using given theoretical probabilities.
14. determine whether experimental or theoretical methods were used to calculate a particular probability.
15.* use combinations, permutations, and probabilities to solve problems.

* GRADE-LEVEL STANDARDS MATCHED TO TEST ITEMS

Summary of Matches Across Grade Levels

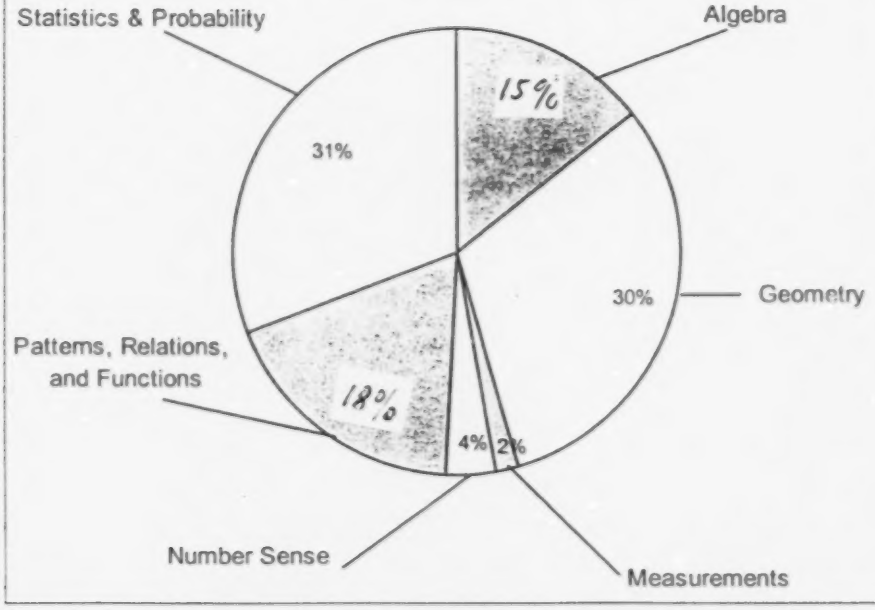
Mathematics Grade 11 Test Stanford 9



*Please refer to The Method of Item Matching section (pg 1-2)

Summary of Matches Across Standards

Mathematics Grade 11 Test: Stanford 9



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Grade 11: Matches and Descriptive Analysis

Grades 9-12 Algebra Standards
Students will:
9. determine roots of polynomial functions including complex roots.

Students must determine the roots of a second-degree polynomial.

Grade 11 (Task 3)
Problem Solving 5

10. determine equations for lines meeting certain conditions.

Given a scatterplot, students must determine the equation for a corresponding line.

Grade 11 (Task 3)
Problem Solving 29

17. derive procedures for determining critical features of circles, ellipses, hyperbolas, or parabolas given equations in standard form.

Given a word problem, students must model the problem with a parabolic equation and determine the vertex to solve.

Grade 11 (Task 3)
Problem Solving 45

19. create algebraic models to represent problem situations.

Students must generate and solve equations and inequalities that represent word problems. Problems may require students to extract information from a chart.

Grade 11 (Task 3)
Problem Solving 1, 7, 11, 45

23. build formulas representing patterns that are algebraic, trigonometric, logarithmic and exponential.

Given the graph of a function, students must identify the formula that best describes it.

Grade 11 (Task 3)
Problem Solving 8

Grades 9-12 Geometry Standards
Students will:

1. know, use, derive formulas for, and solve problems involving perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.

Students must calculate the perimeter, circumference, area, and volume of figures. Some problems require students to use the Pythagorean Theorem to find the lengths of sides or radii.

Grade 11 (Task 3)
Problem Solving 6, 15-17, 20, 21

5. explore and analyze the properties of triangles.

Students must solve problems using proportional triangles. To find angle measures, students must know that the angles of a triangle equal 180 degrees.

Grade 11 (Task 3)
Problem Solving 13, 14

8. investigate and use properties of angles, arcs, chords, tangents, and secants to solve problems.

Students must use the equality of corresponding angles and supplementary angles to find unknown angles.

Grade 11 (Task 3)
Problem Solving 12

9. identify, create, and solve practical problems involving triangles and vectors.

Students must add distances to find the lengths of sides of a triangle and then use the Pythagorean Theorem to find the hypotenuse.

Grade 11 (Task 3)
Problem Solving 48

15. select transformations required to map images of objects.

Given the coordinates of a point, students must determine the resulting coordinates after the point is reflected across a line.

Grade 11 (Task 3)
Problem Solving 22

18. represent situations using the properties of coordinate geometry to answer pertinent questions.

Students must use coordinate graphs to solve problems involving area, circumference, and midpoint.

Grade 11 (Task 3)
Problem Solving 18-22, 26

Grades 9-12 Measurement Standards
Students will:
3. use quotient units of measure and relate them to slope. (example: speed, density)

Students must calculate the slope of a distance-time graph to find an object's speed.

Grade 11 (Task 3)
Problem Solving 26

Grades 9-12 Number Sense Standards
Students will:

8. add, subtract, multiply, and divide real numbers including roots and exponents using appropriate computational strategies. (example: mental mathematics, paper and pencil, calculator)

Students must follow directions to add and subtract numbers to calculate an answer.

Grade 11 (Task 3)
Problem Solving 38

15. apply properties of arithmetic and geometric sequences and series to solve problems. (example: write the first n terms, find the nth term, evaluate summation formulas)

Given the summation formula, students must find the sum of a geometric sequence.

Grade 11 (Task 3)
Problem Solving 41

Grades 9-12 Patterns, Relations, and Functions Standards
Students will:

1. use various representations of functions. (example: graphs, tables, symbolic forms)

Students must recognize which graph best represents a table of values. Students must use the cosine function to solve problems.

Grade 11 (Task 3)
Problem Solving 9, 23-25

3. apply transformations to the graph of a basic function and predict and analyze the results.

Students must identify which graph represents a vertical translation.

Grade 11 (Task 3)
Problem Solving 10

4. determine the domain, range, zeros, y-intercepts, end behavior, relative maximum and minimum points, and symmetry of functions.

   Students must identify maximum and minimum points of a sine graph and parabola.

   Grade 11 (Task 3)
   Problem Solving 40, 45

10. determine which type of function best models a situation, write an equation, and use this equation to answer questions about the situation.

    Given a word problem, students must write an equation or inequality that represents the problem situation.

    Grade 11 (Task 3)
    Problem Solving 1

16. compare, contrast, and extend arithmetic and geometric patterns of growth and use them to make predictions.

    Students must generalize the pattern in a simple direct variation problem and then solve.

    Grade 11 (Task 3)
    Problem Solving 7

17. determine and use recursive formulas to express iterative patterns of change including those of exponential growth and decay.

    Students must solve problems that involve exponential decay.

    Grade 11 (Task 3)
    Problem Solving 37

Grades 9-12 Statistics & Probability Standards
Students will:

1. analyze and evaluate surveys and experiments conducted by others. (example: bias, randomness, analysis, interpretation)

   Students must interpret data represented in bar graphs, pie charts, and two-column charts. Given the experimental probability of two events occurring, students must calculate the probability of both events occurring.

   Grade 11 (Task 3)
   Problem Solving 27,28,31-34

6. describe the normal curve and use it to predict percentiles and probabilities.

   Presented with a normal curve distribution, students must answer questions involving probability.

   Grade 11 (Task 3)
   Problem Solving 36

7. use scatterplots, regression lines, and correlation coefficients to model data and support conclusions.

   Students must create equations based on scatterplots.

   Grade 11 (Task 3)
   Problem Solving 29

8. determine probabilities using counting procedures, tables, tree diagrams, and formulas for permutations and combinations.

   Students must determine the probability of events occurring from pie charts and normal curve distributions.

   Grade 11 (Task 3)
   Problem Solving 34, 36

9. determine probability of compound, complementary, independent, and dependent events.

Given probability of independent events, students must determine compound probabilities.

Grade 11 (Task 3)
Problem Solving 33, 35

13. predict outcomes of simple and compound events using given theoretical probabilities.

Given theoretical probabilities, students must determine the likely outcome of events.

Grade 11 (Task 3)
Problem Solving 30, 32

15. use combinations, permutations, and probabilities to solve problems.

Students must count the ways numbers can be arranged in order to answer a question.

Grade 11 (Task 3)
Problem Solving 39, 47

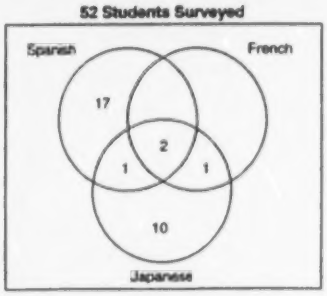
Test Items Not Matched to Any Standard

Students must interpret and complete Venn diagrams to solve problems. Students must understand elapsed time to solve problems involving fractions.

Grade 11 (Task 3)
Problem Solving 44, 46

44 **In a survey, 52 students who spoke English in addition to Spanish, French, or Japanese were asked to identify the languages they could speak. Some of the results are shown in the diagram. Some other results are these:**

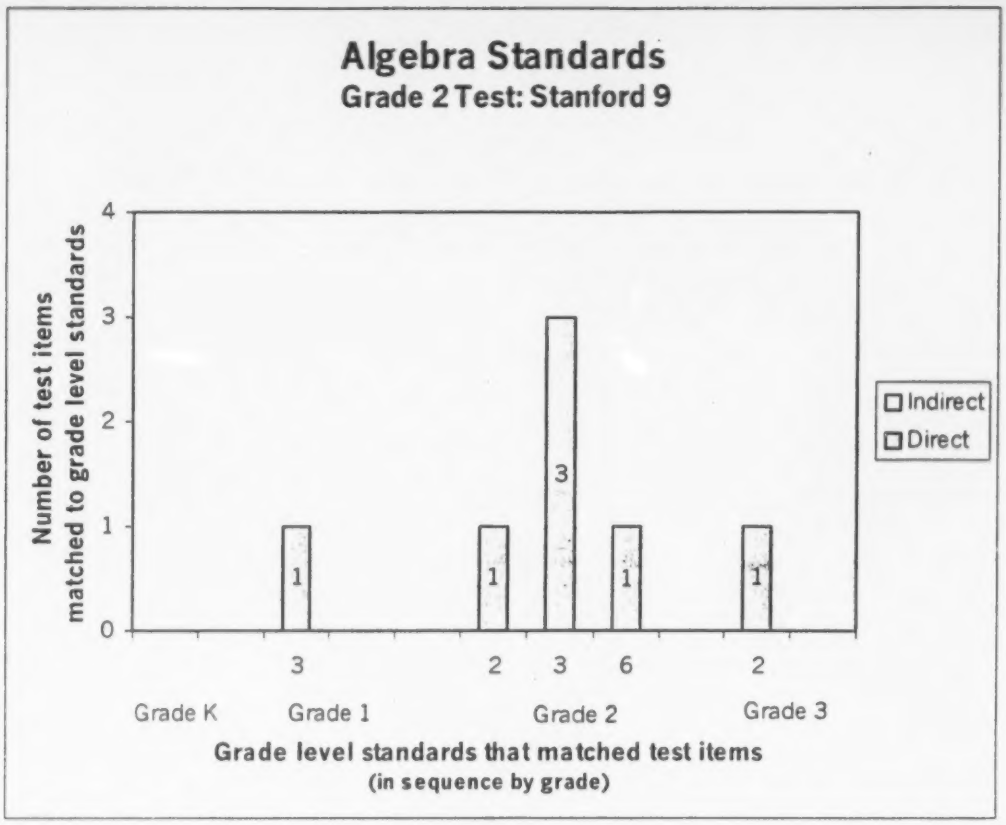
A total of 32 students spoke Spanish.
A total of 24 students spoke French.

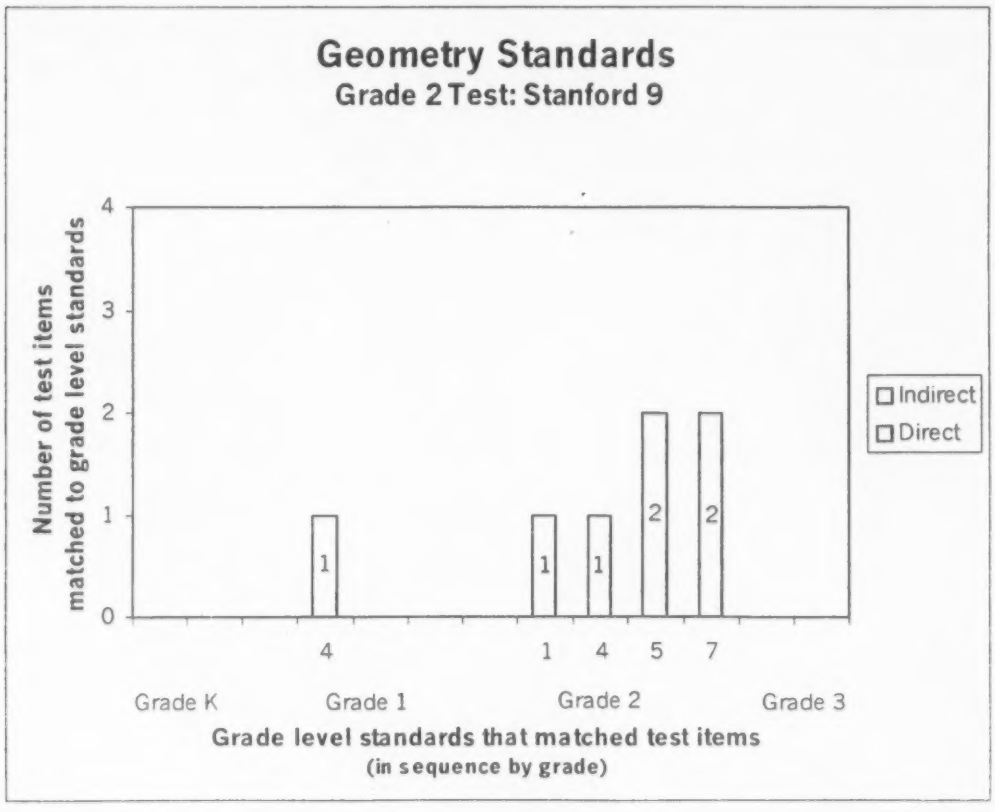


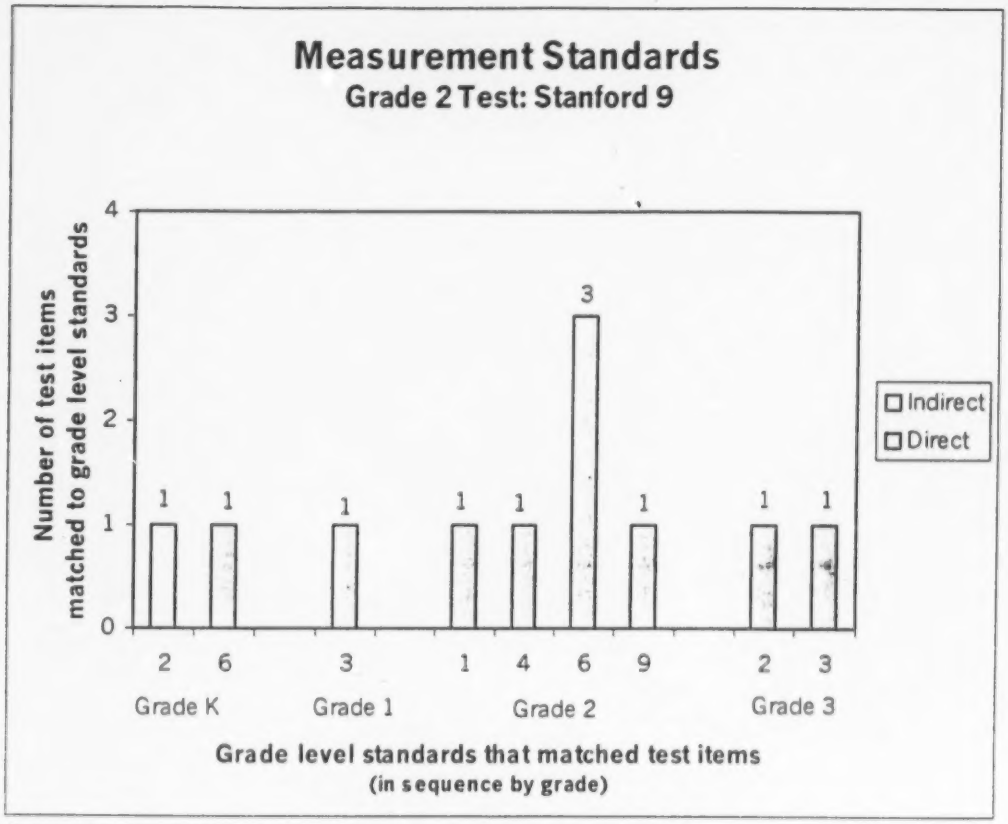
How many of the 52 students surveyed could speak *only* French in addition to English?

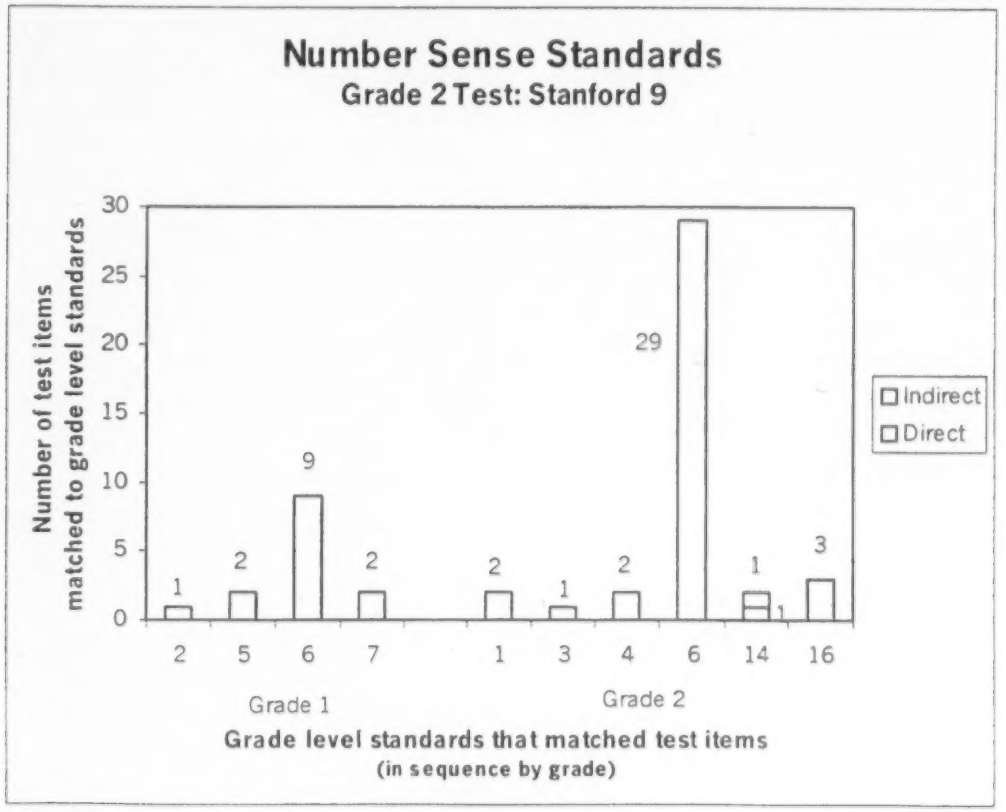
F 29
G 21
H 17
J 9

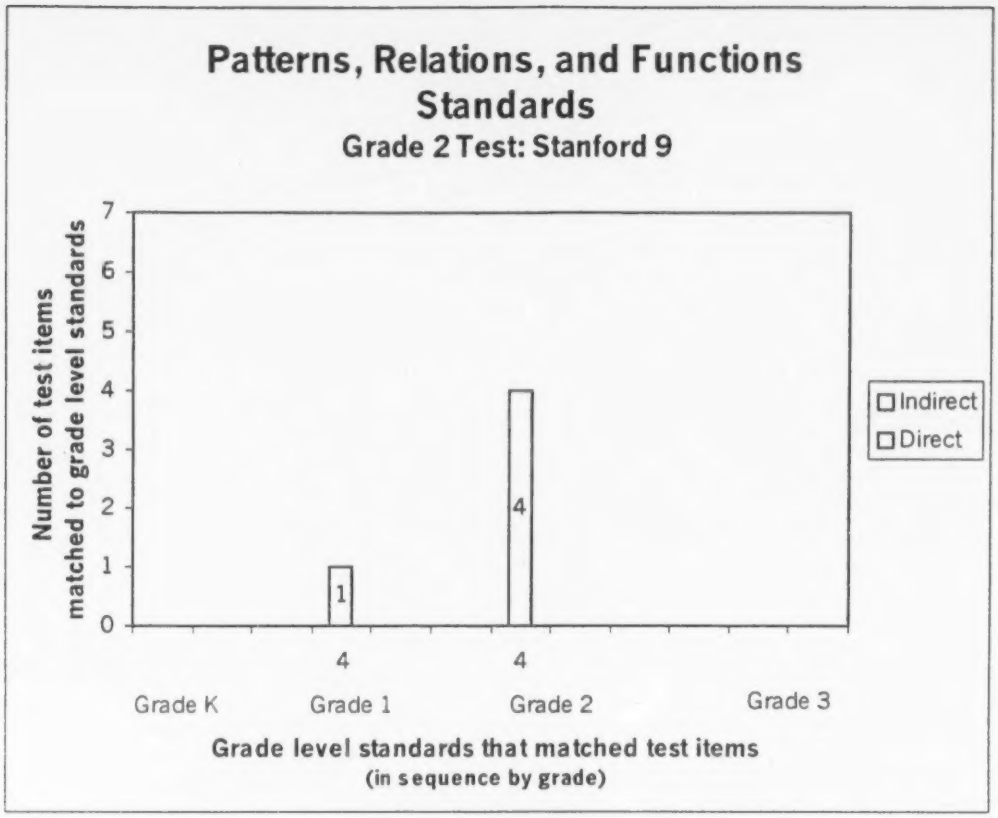
APPENDIX B2

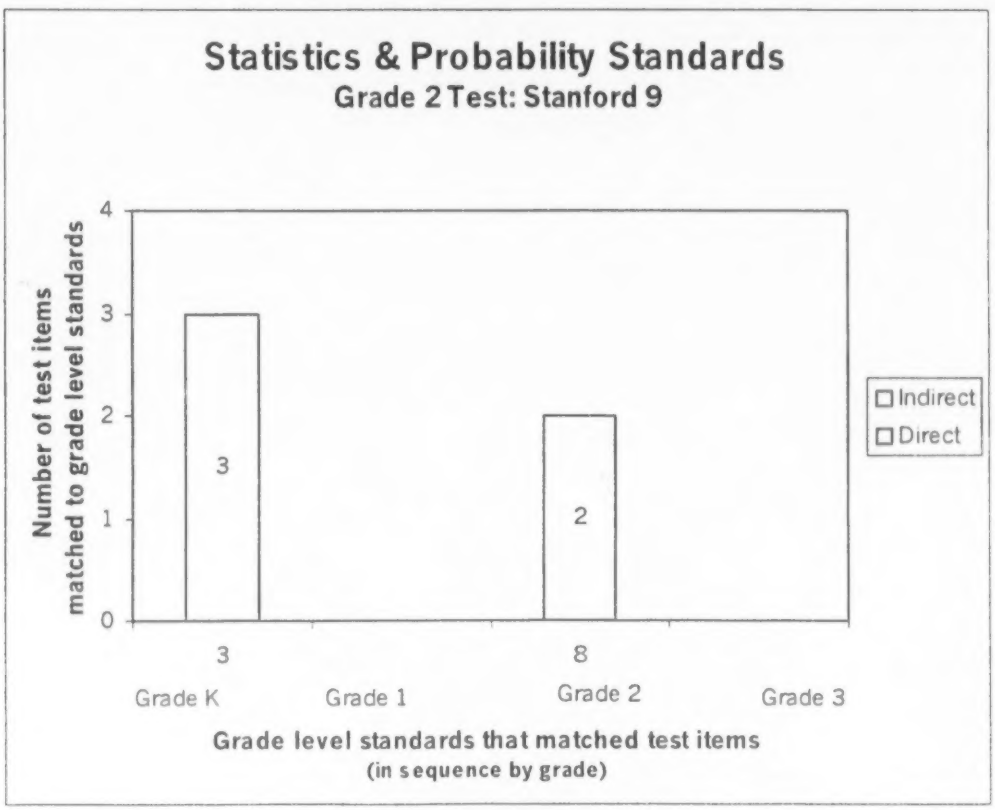

Algebra Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1
1
3
1
1
3
2
6
2
Grade K
Grade 1
Grade 2
Grade 3
Grade level standards that matched test items
(in sequence by grade)
Indirect
Direct


Geometry Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1
1
1
2
2
4
1
4
5
7
Grade K
Grade 1
Grade 2
Grade 3
Grade level standards that matched test items
(in sequence by grade)
Indirect
Direct

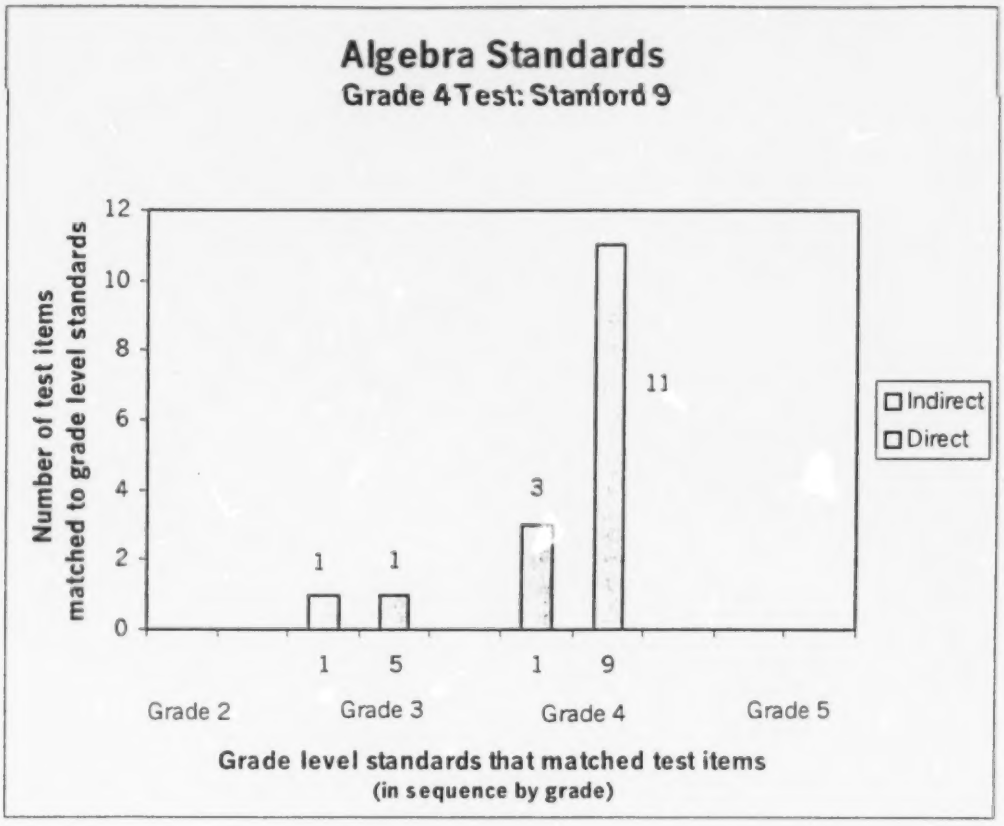

Measurement Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1 1 1 1 1 3 1 1 1
2 6 3 1 4 6 9 2 3
Grade K
Grade 1
Grade 2
Grade 3
Grade level standards that matched test items
(in sequence by grade)
Indirect
Direct

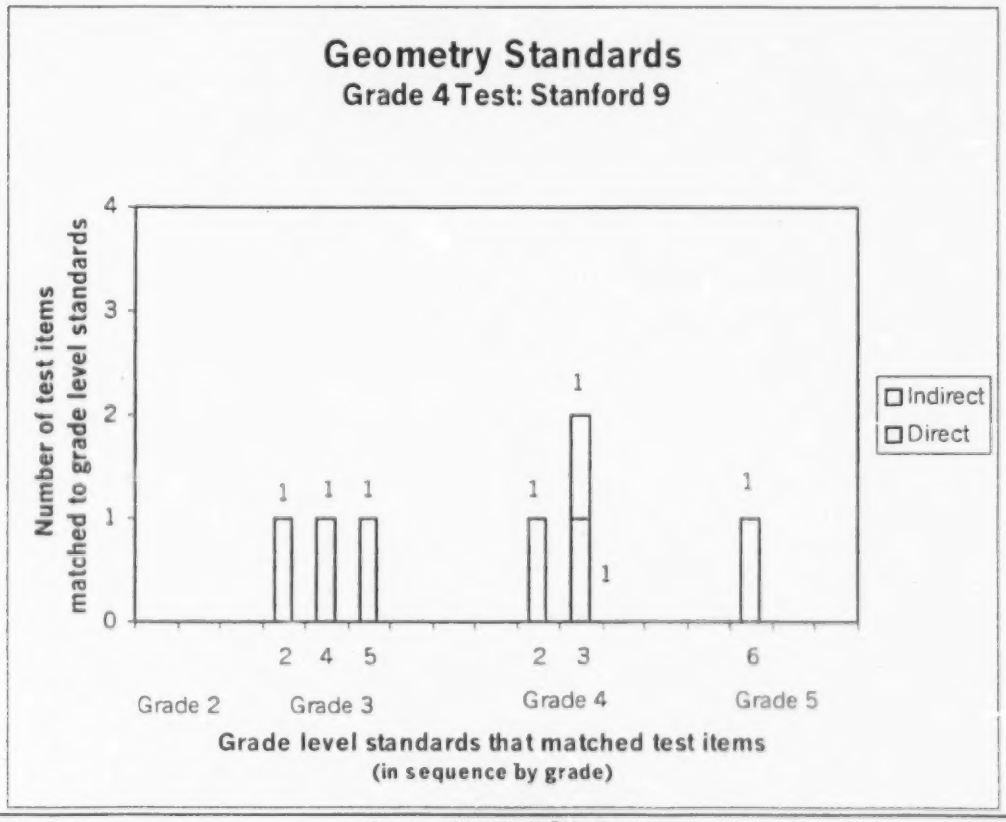

Number Sense Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
5
10
15
20
25
30
1 2 9 2 2 1 2 29 1 3
2 5 6 7 1 3 4 6 14 16
Grade 1
Grade 2
Grade level standards that matched test items
(in sequence by grade)
Indirect
Direct

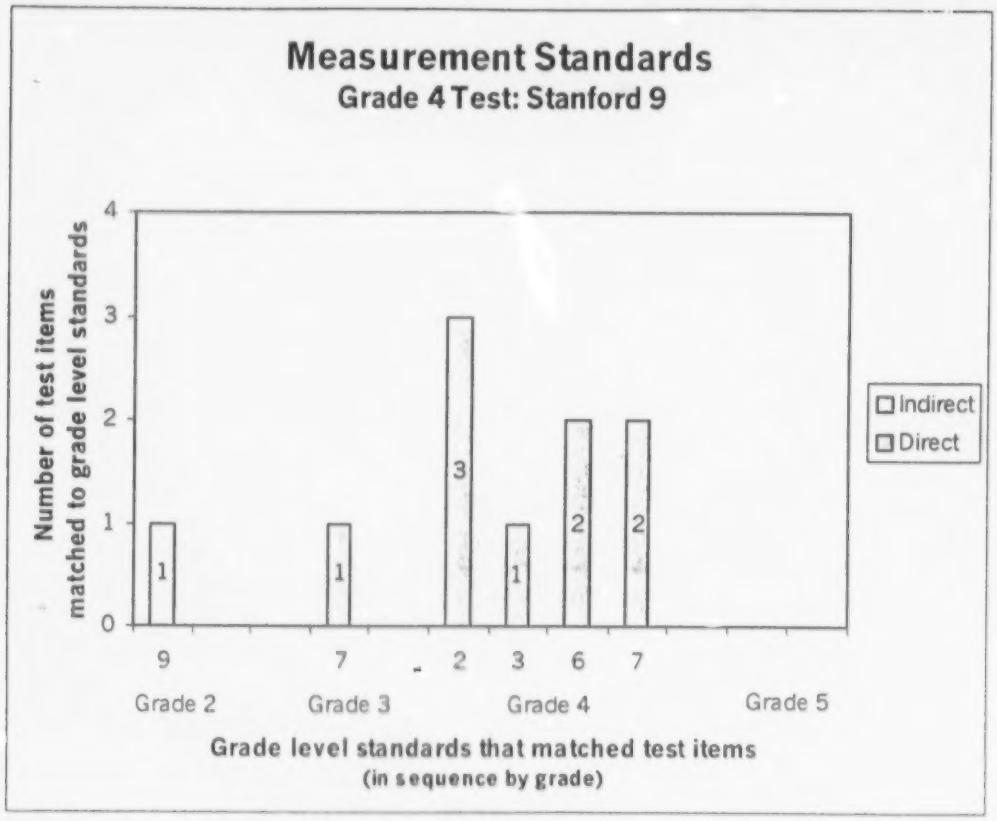

Patterns, Relations, and Functions Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
5
6
7
1
4
4
Grade K
Grade 1
Grade 2
Grade 3
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

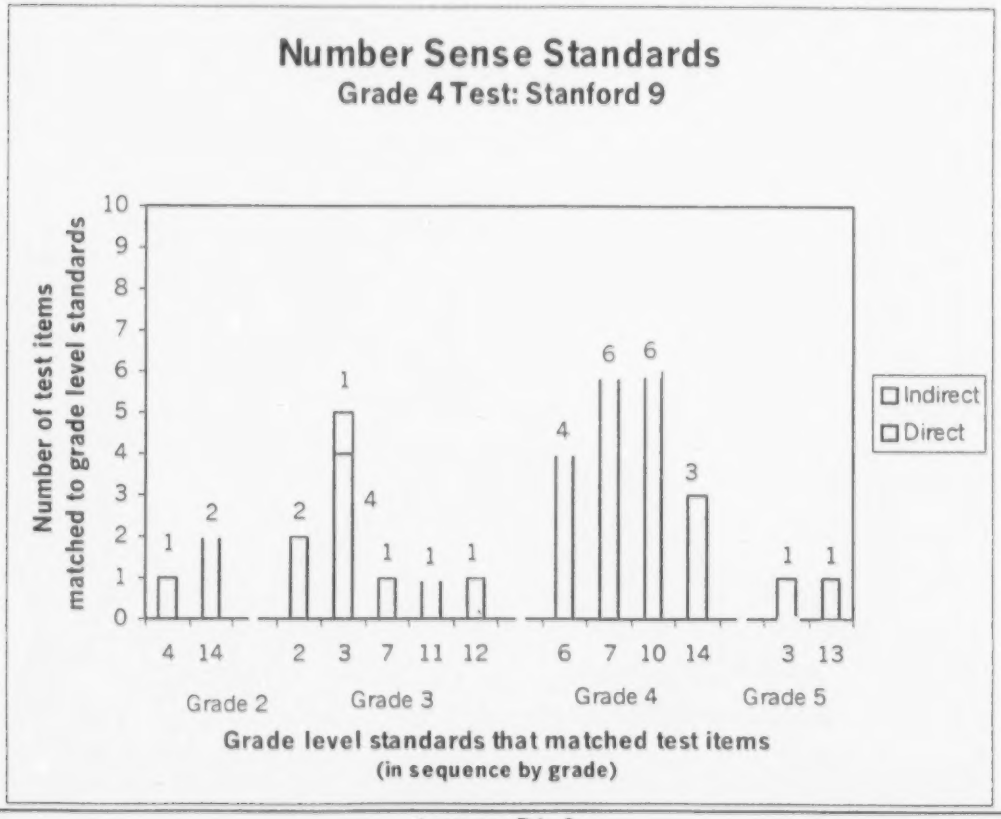

Statistics & Probability Standards
Grade 2 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
3
2
3
8
Grade K
Grade 1
Grade 2
Grade 3
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

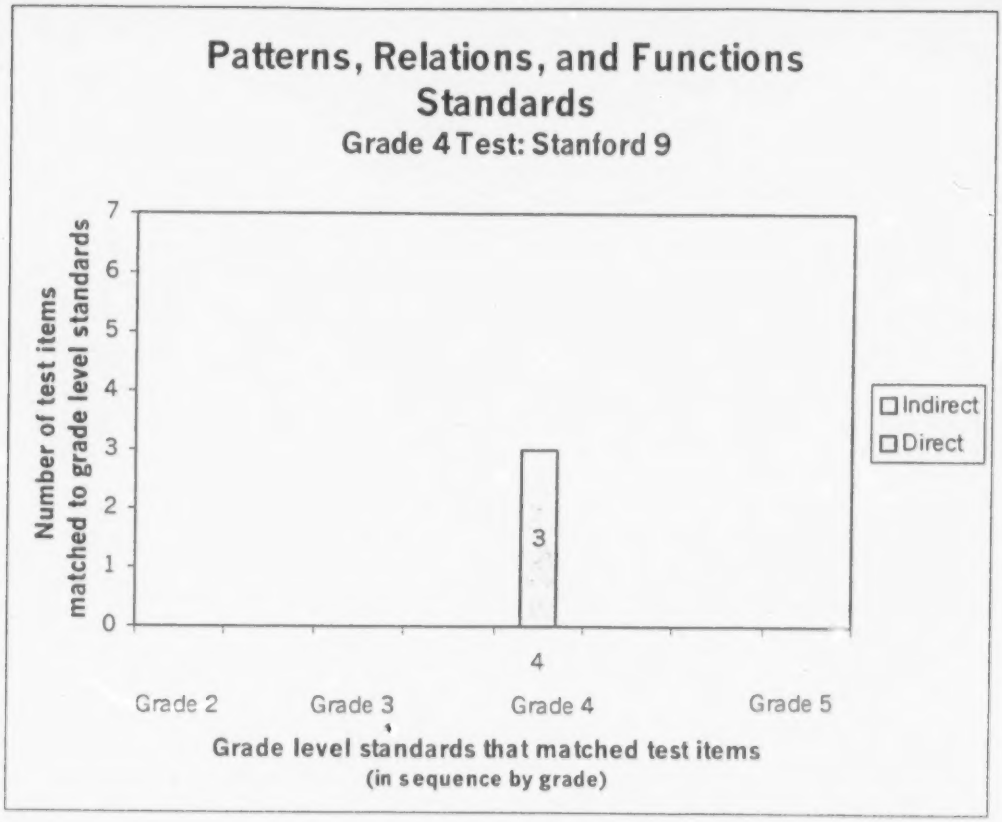
APPENDIX B4

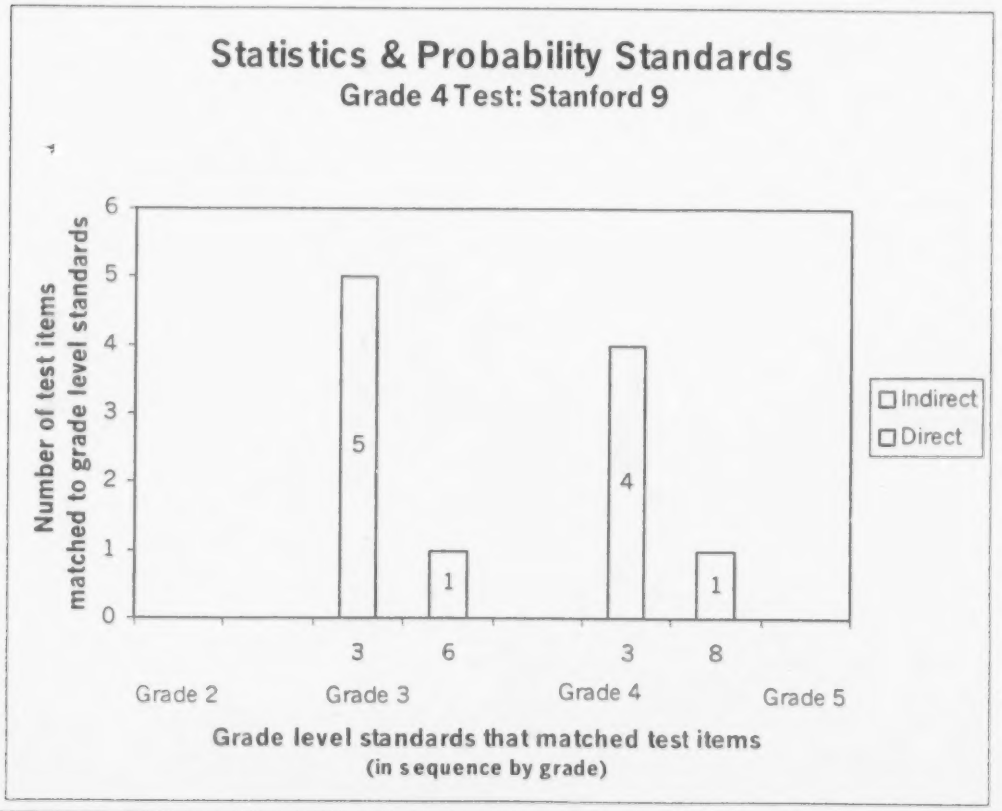

Algebra Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
12
10
8
6
4
2
0
1
1
3
11
1 5 1 9
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Geometry Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
4
3
2
1
0
1 1 1
1
1
1
1
2 4 5 2 3 6
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

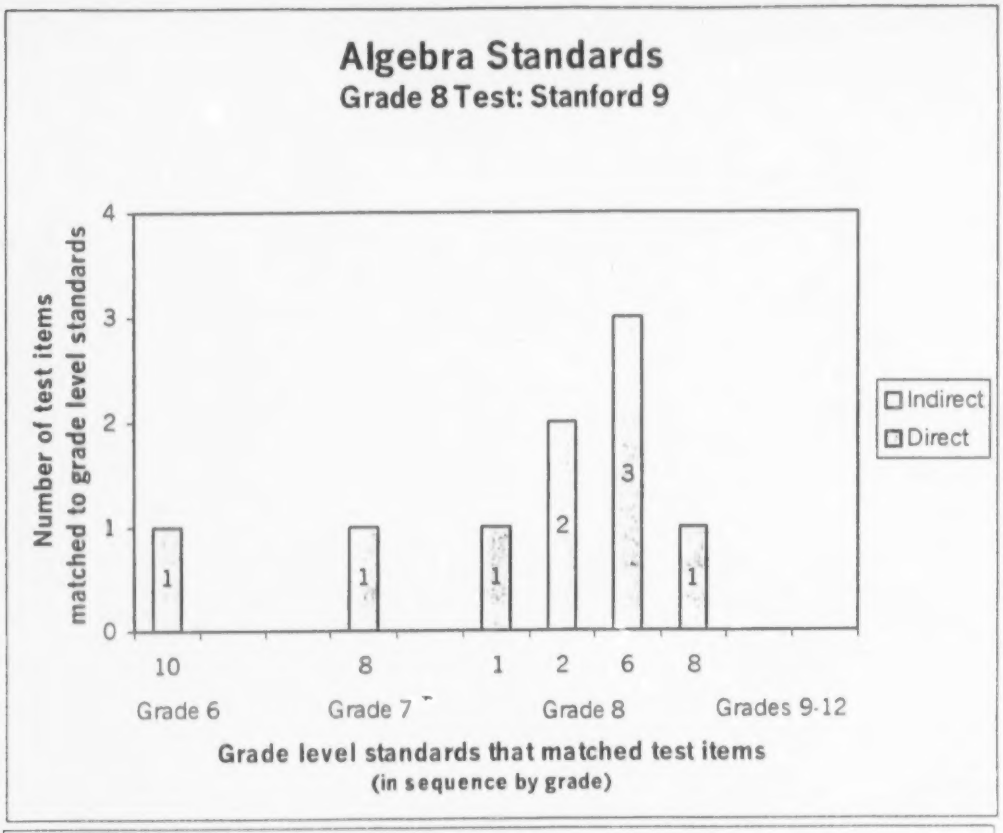

Measurement Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1
1
3
1
2
2
9
7
2
3
6
7
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

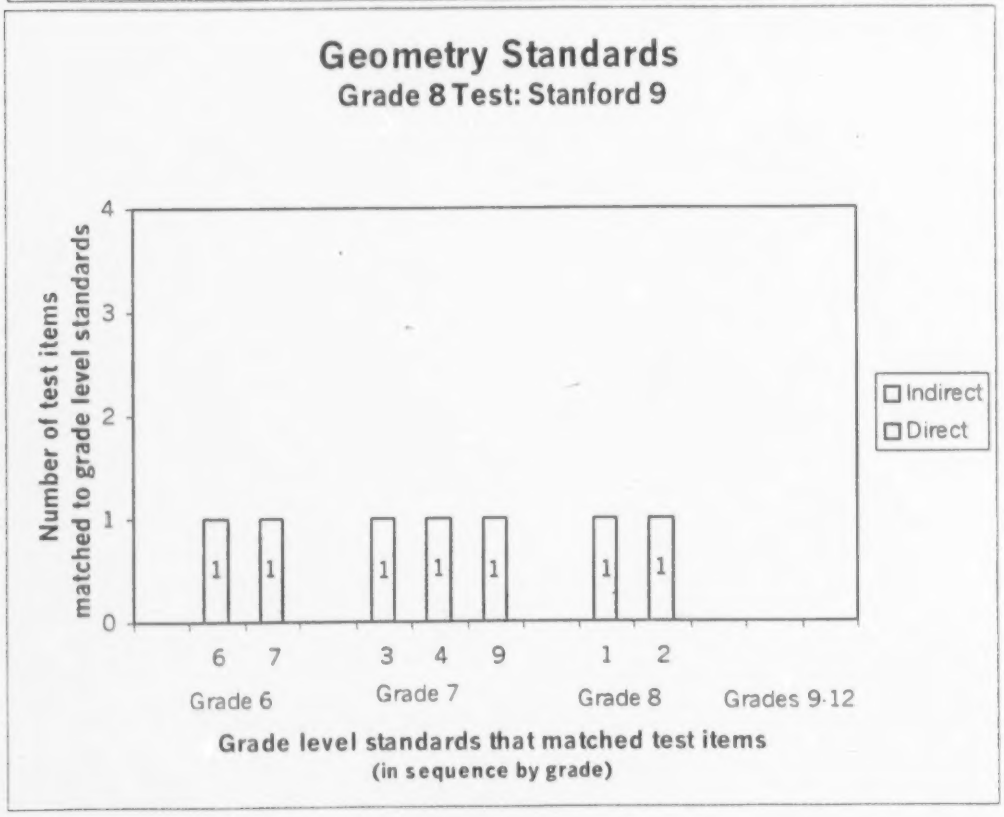

Number Sense Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
5
6
7
8
9
10
1
2
2
1
4
1
1
1
4
6
6
3
1
1
4 14
2 3 7 11 12
6 7 10 14
3 13
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Patterns, Relations, and Functions Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
5
6
7
3
4
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

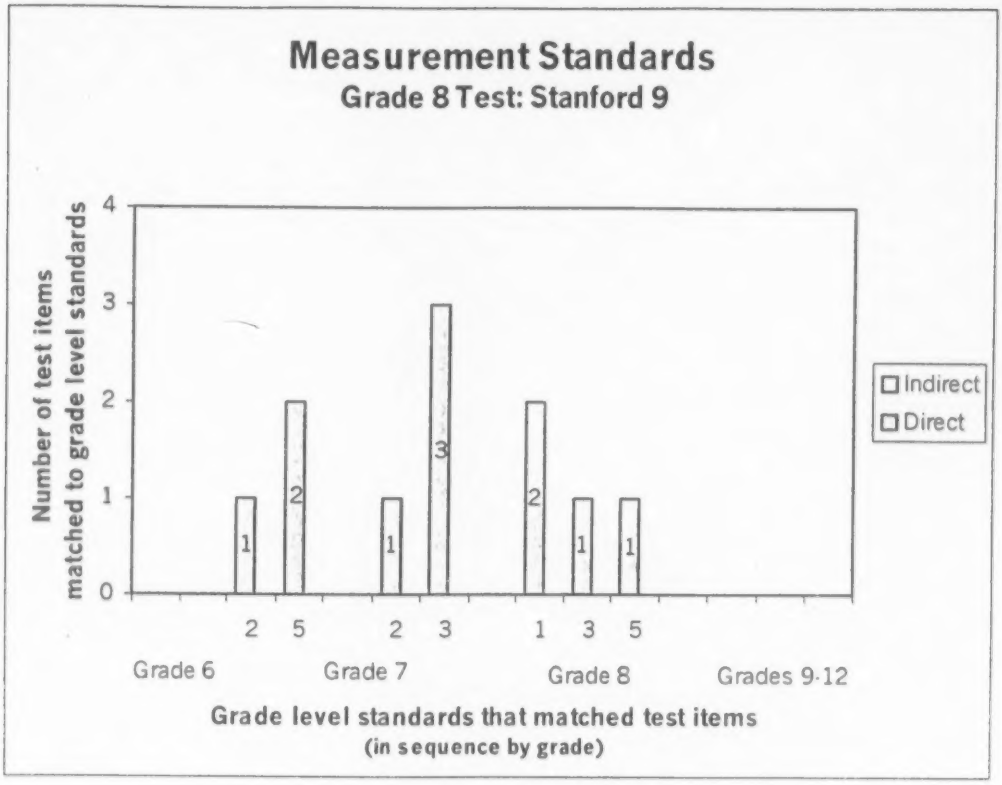

Statistics & Probability Standards
Grade 4 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
5
6
5
1
4
1
3
6
3
8
Grade 2
Grade 3
Grade 4
Grade 5
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

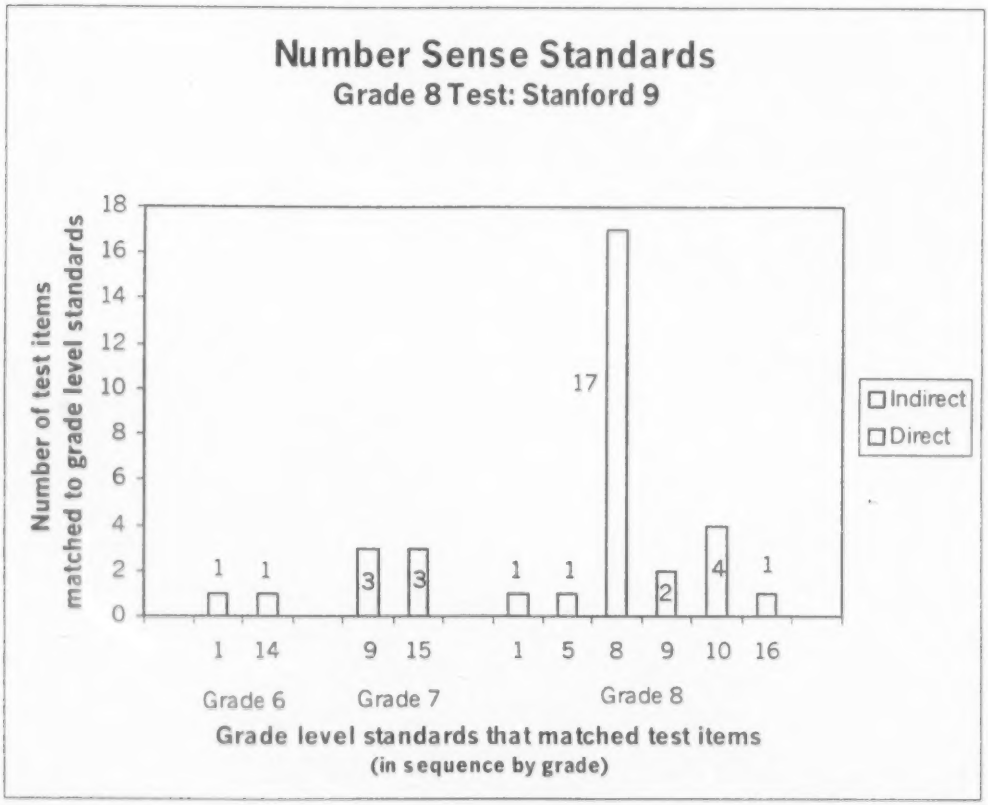
APPENDIX B8

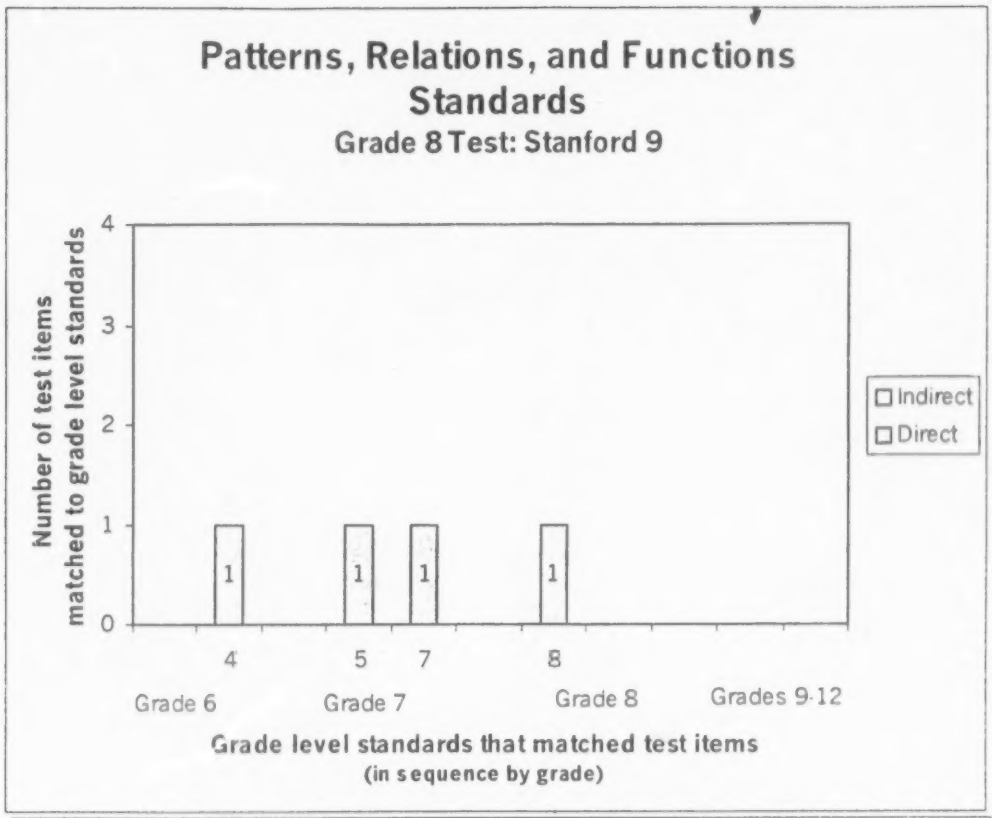


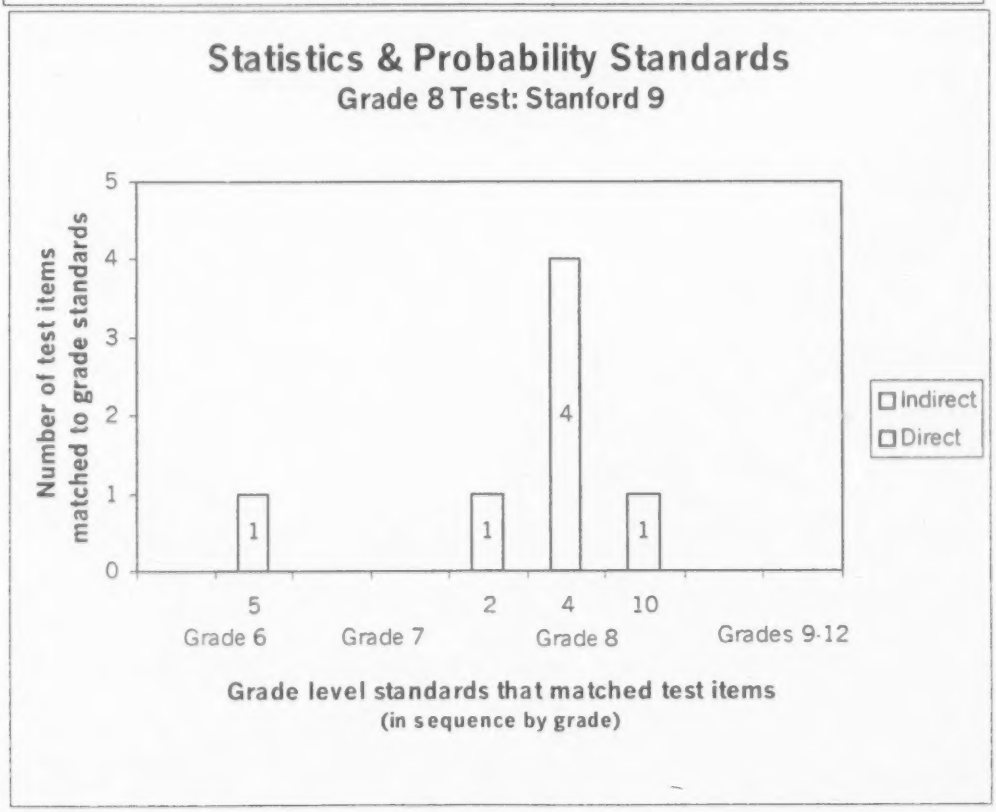


BEST COPY AVAILABLE

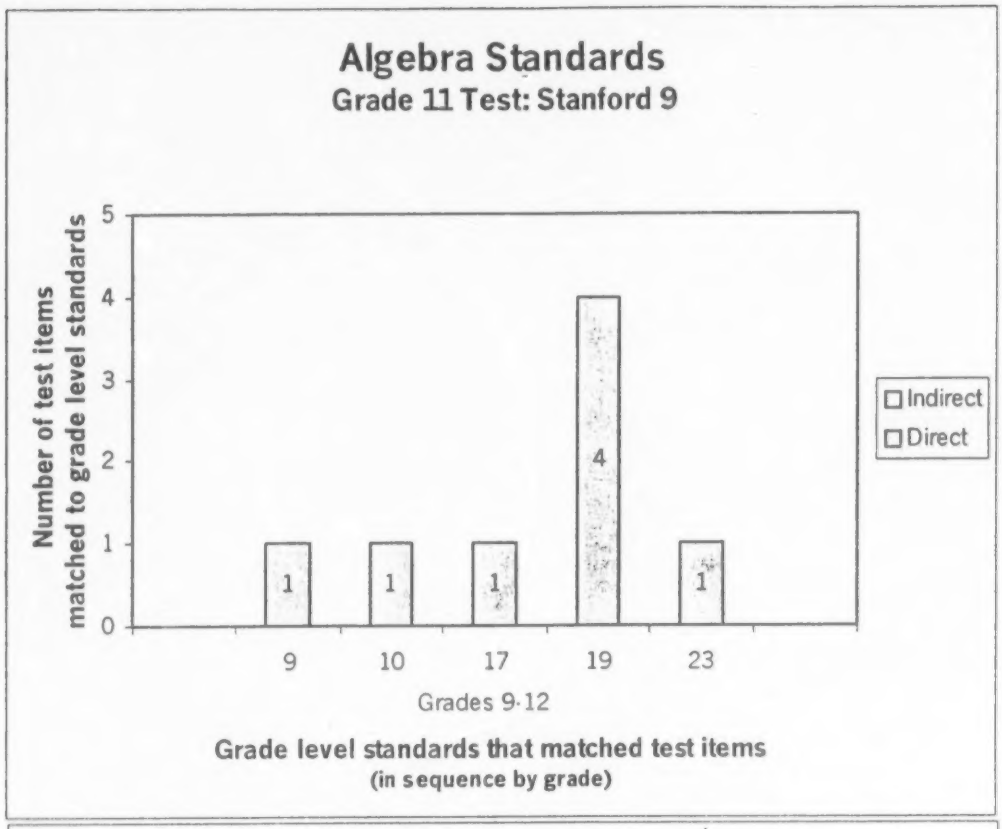

Measurement Standards
Grade 8 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1
2
1
3
2
1
1
2 5 2 3 1 3 5
Grade 6
Grade 7
Grade 8
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

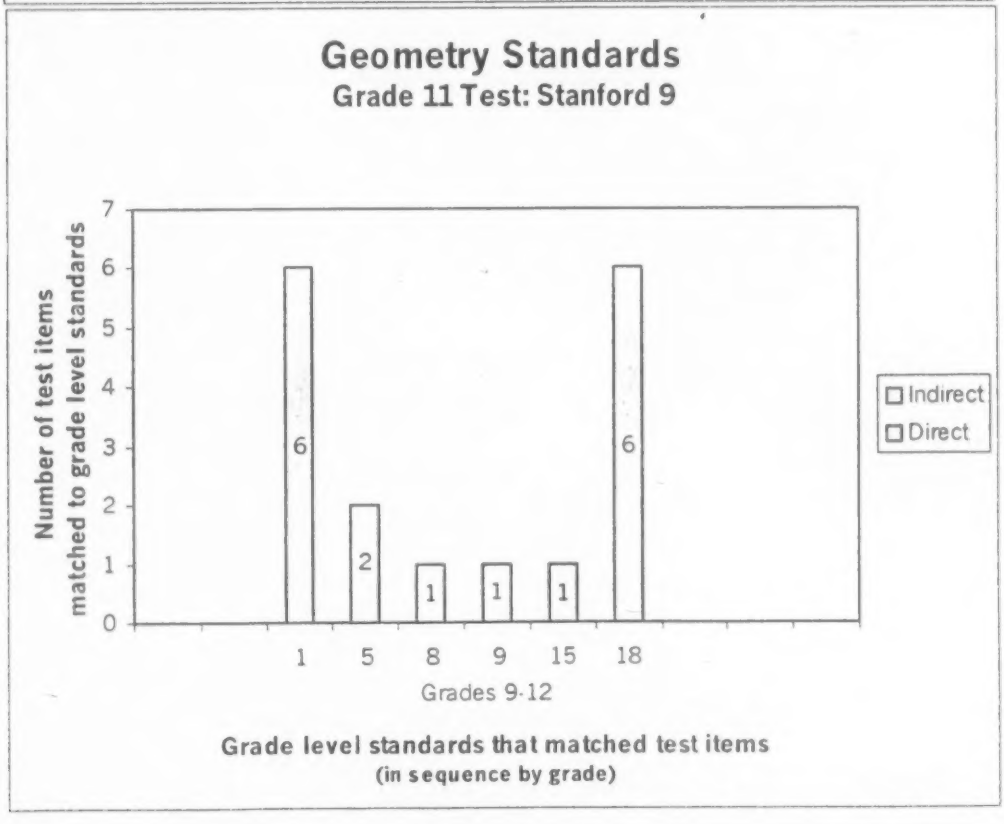

Number Sense Standards
Grade 8 Test: Stanford 9
Number of test items matched to grade level standards
0
2
4
6
8
10
12
14
16
18
1
1
3
3
1
1
17
2
4
1
1 14 9 15 1 5 8 9 10 16
Grade 6
Grade 7
Grade 8
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Patterns, Relations, and Functions
Standards
Grade 8 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
1
1
1
1
4
5
7
8
Grade 6
Grade 7
Grade 8
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Statistics & Probability Standards
Grade 8 Test: Stanford 9
Number of test items matched to grade standards
0
1
2
3
4
5
1
1
4
1
5
2
4
10
Grade 6
Grade 7
Grade 8
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)

APPENDIX B11





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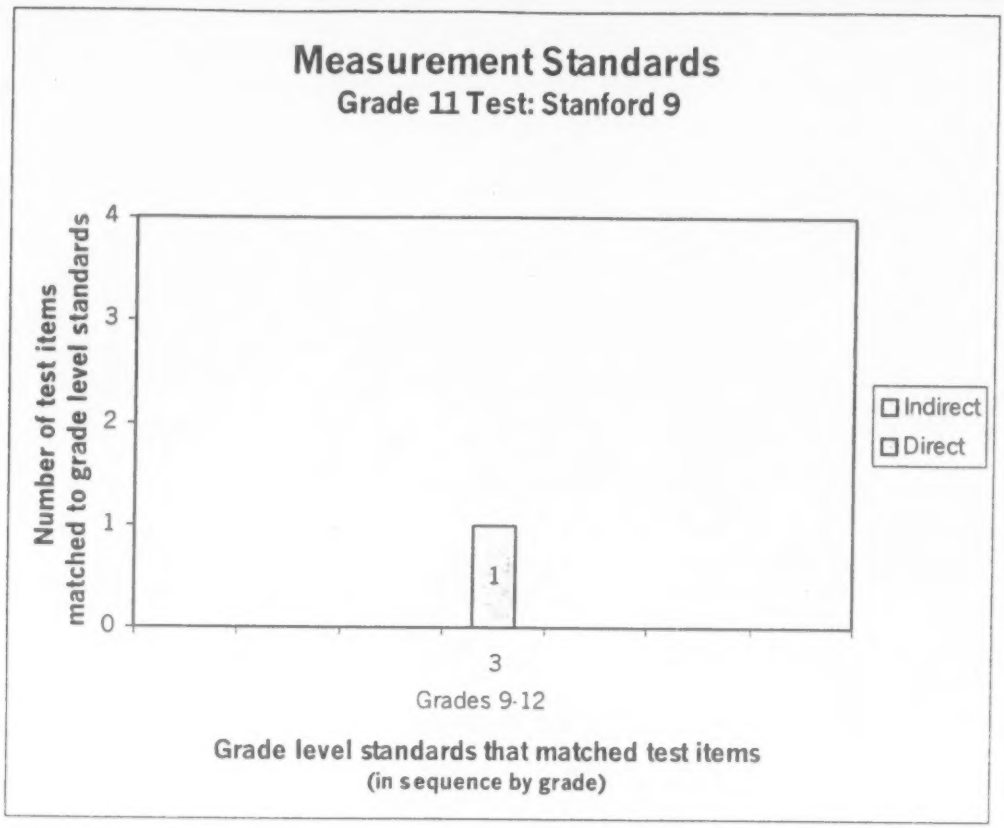
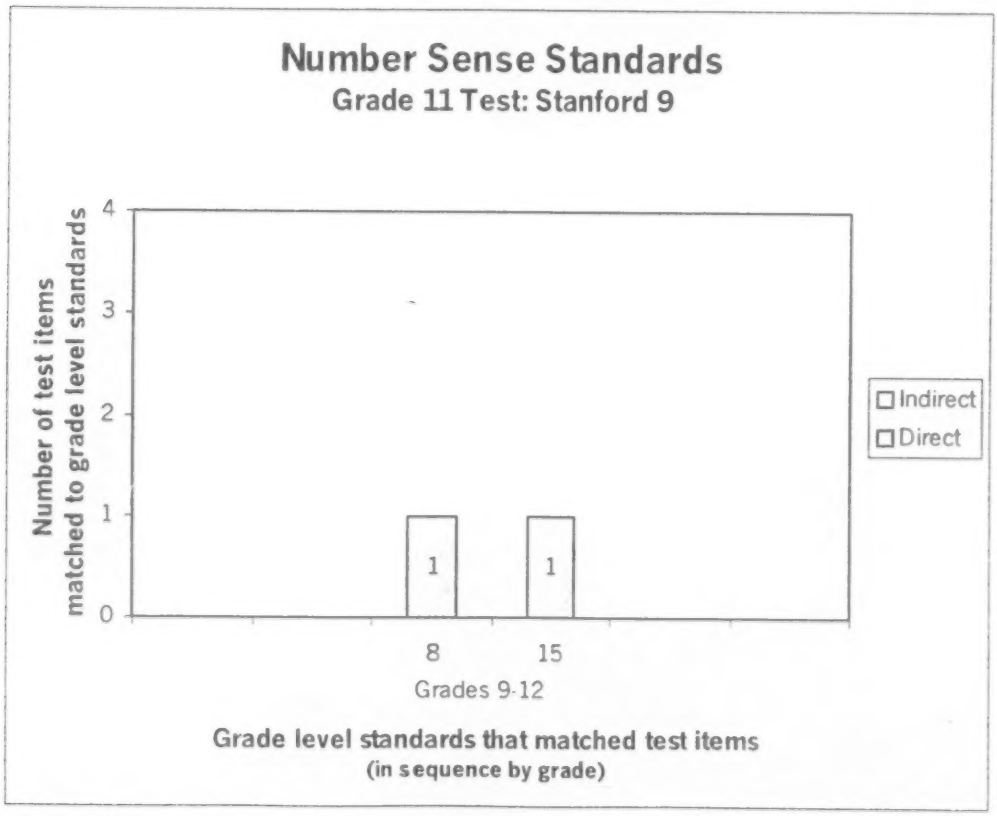
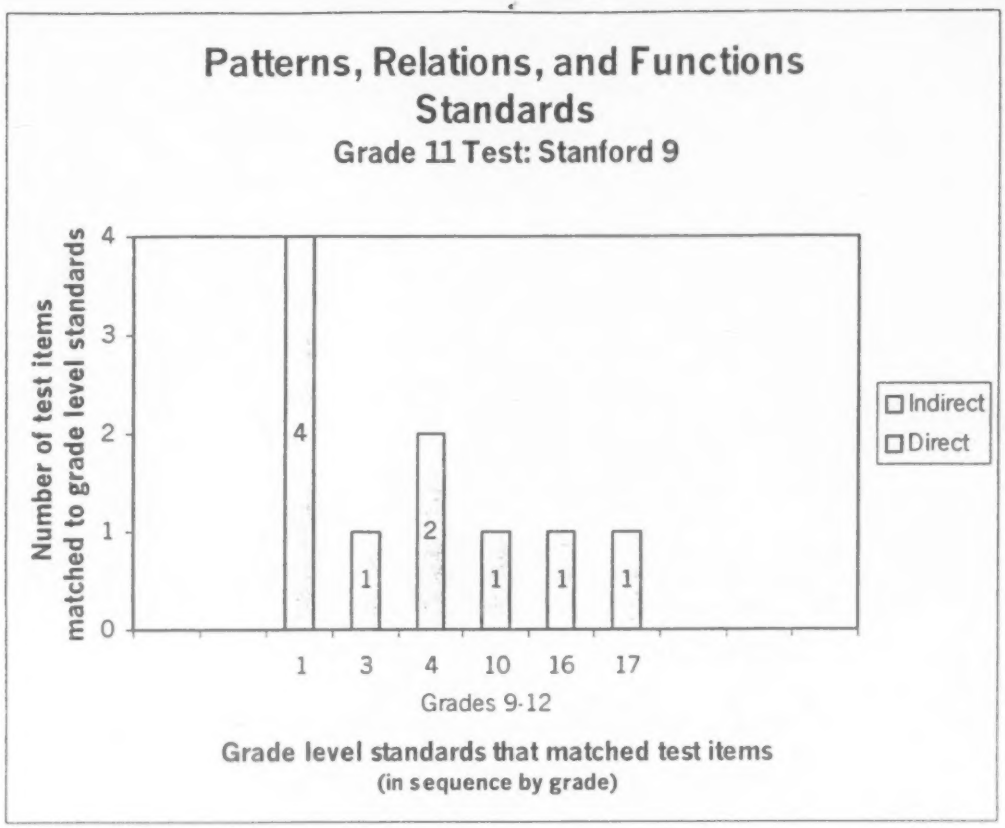
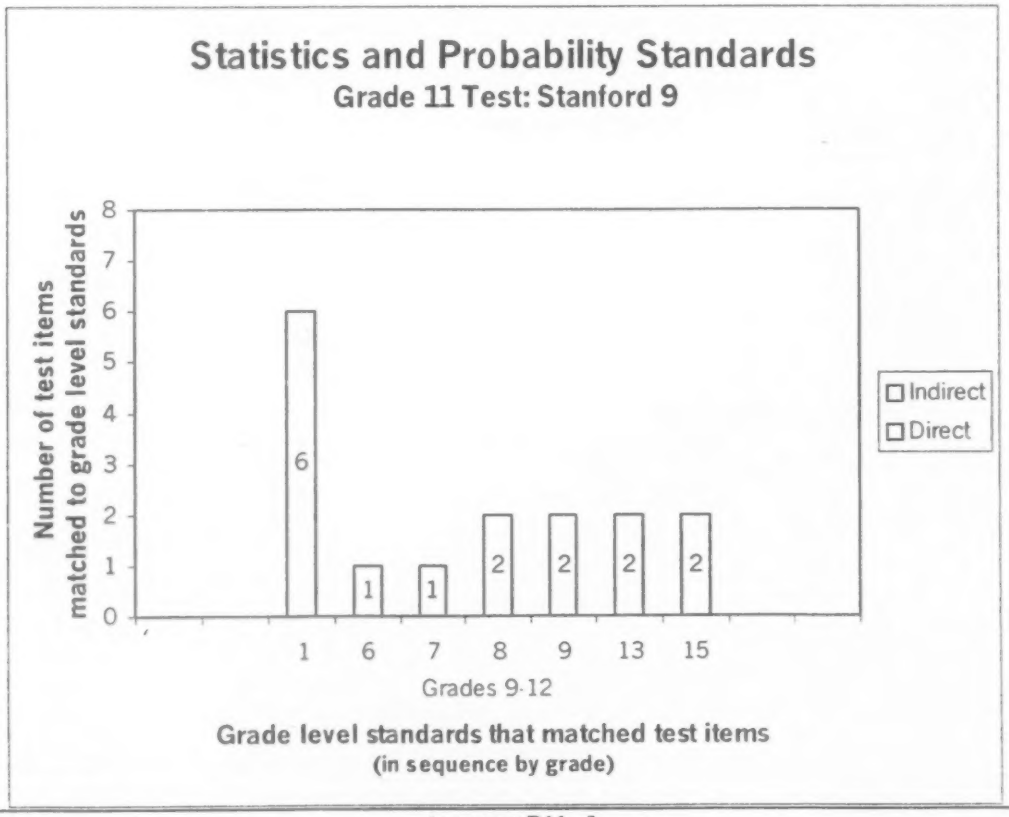

Measurement Standards
Grade 11 Test: Stanford 9
Number of test items matched to grade level standards
4
3
2
1
0
1
3
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Number Sense Standards
Grade 11 Test: Stanford 9
Number of test items matched to grade level standards
4
3
2
1
0
1
1
8
15
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Patterns, Relations, and Functions
Standards
Grade 11 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
4
1
2
1
1
1
1
3
4
10
16
17
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)


Statistics and Probability Standards
Grade 11 Test: Stanford 9
Number of test items matched to grade level standards
0
1
2
3
4
5
6
7
8
6
1
1
2
2
2
2
1
6
7
8
9
13
15
Grades 9-12
Indirect
Direct
Grade level standards that matched test items
(in sequence by grade)